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IN THIS ISSUE

Cover Photo 14
Jeweled Christmas Tree, *Wienrank* 3
Museum and the Collector, *MacFall* 5
Clay Science, *Hyatt* 7
Paste—World's First Imitations, *Willems* 13
Rare Fossils in Kansas, *Watson* 15
Prize Question for November, *Fleener* 18
The Cashion Meteorite, *Stockwell and Morley* 20
Wood from Nature's Deep Freeze, *Guennel* 22
How to Cut Thomsonite, *Willems* 36
How to Set Gems Without Soldering, *Endres* 38
Midwest Federation Bulletin, *Wienrank* 40
Book Reviews 42

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JEWELED CHRISTMAS TREE

by Bernice Wienrank

A fairyland Christmas tree . . . decorated with amethysts, opals, agate, jade and jasper . . . revolving in the glow of concealed spotlights . . . glittering with jewels valued at more than $5,000 . . .

Such was the newspaper description of Chicago Lapidary Club's first jeweled Christmas tree, which has since become a tradition of the club. The tree was made even more dramatic the second year by the addition of fluorescent ornaments. Bathed in white light the tree presented a striking effect as a profusion of colorful gems sparkled softly against its snowy branches; but when touched by black light it was spectacular. It became a cloud of purple and a coruscation of crimson, gold, green and blue, amid (*all* of) which glowed stars, bells, angels, etc. . . . truly a fairyland tree.

Word of the success of the jeweled yule tree has spread and many lapidary clubs have asked CLC for information. The club is pleased to pass along what it has learned about the mechanics of producing this feature attraction of its annual Christmas meetings.

It is a relatively simple project, its success depending largely on the interest and cooperation shown by the membership. At its first fall meeting of the year CLC appoints a Christmas tree committee. This year, as in previous years, the committee is headed by Mrs. Gladys Board, who is noted for both her organizational ability and artistic judgment.

The committee has the following duties:

1. Publicize the project.
2. Inform all members that they are expected to prepare ornaments for the tree.
3. Provide and prepare the tree, revolving stand, black and white lights.
4. Accept and receipt for gem-ornaments.
5. Decorate the tree.
6. Post a "tree host" to answer questions and see that ornaments are not handled.
7. Dismantle the tree and return the ornaments to their owners.

Publicizing the tree is very important for stimulating the interest of the membership. Apathy could result in a tree with bare branches. One trick for getting attention is to post a small cut-out of a "jeweled Christmas tree" alongside the bulletin board announcement of the project. An advance display of Christmas tree gem-ornaments will also attract attention, as well as aid those who need something to inspire them before they can get started working.

Only a well-shaped, fresh tree is a fitting background for begemmed decorations. Cut trees are often several months old before they arrive in Chicago; CLC therefore relies on a nursery for a fine specimen. The tree is sprayed white and before it is dry, is sprinkled lightly with Tide detergent. The flakes of Tide fluoresce a beautiful blue under the black light.

The tree's exotic ornaments are best displayed when it revolves. It would also be impractical to endeavor to spotlight the tree from all sides. The movement of the gems adds to their sparkle.

There are two types of ultra-violet rays: long wave and short wave. The long wave type has a longer range and is therefore better adapted to flooding the entire tree with its invisible rays. Improvised black lights should be avoided since they may prove harmful to the eyes. Since only a few gems will fluoresce, the mountings of the ornaments should be touched up with fluorescent chalk, whose vivid colors are apparent only under black light.

It is wise when setting up the tree to place it in a corner; it will be easier to light and those assigned to safeguarding

***JEWELED CHRISTMAS TREE.** (December 1952) Left to right. John Stefans, Park District Instructor; Fred Minuth, Registered Gemmologist; Bernice Wienrank, Originator of Christmas Tree idea. Black light (in foreground) used to display fluorescent effects of certain specimens exhibited on tree.*

the ornaments will not have to watch the back of the tree. Low benches or tables placed in front of the tree can act both as unobtrusive barriers to over-eager viewers and as supports for the black and white lights. Place the benches just far enough away from the tree so that admirers cannot reach across them to touch the ornaments but will still be close enough to get a clear view of the gems. It is impossible to keep people from handling the gems when they are within reach; given the chance, someone may drop and damage one.

Valuable gems should not be delivered to the meeting hall until the day of the meeting, unless special precautions can be taken to protect them. Members should bring them to the committee at least an hour before the meeting begins, however, so that the committee will have plenty of time to list the ornaments and place them on the tree. To avoid a bottleneck at the last minute, several people should be assigned to receiving and listing the ornaments. Brief descriptions of the gems should also be written—it has been found that ornaments are usually distinctive enough so that further identification is unnecessary. Following the meeting, the list is used as a reference when returning the stones. None who has exhibited gems on CLC's jeweled tree has ever suffered a loss. Some gems that were displayed on the tree were valued as high as $500.

The ingenuity displayed by members is often amazing, as may be seen from sketches accompanying this article. Studying and admiring each other's handiwork is half

(Concluded on Page 14)

THE MUSEUM AND THE COLLECTOR

Russell P. MacFall

In nature, many organisms strike up a working arrangement that the biologists call symbiosis. Thus it is with the museum and the collector. Most of the great mineral collections in American museums owe their origin and their chief treasures to the collectors who either had the money to buy up fine specimens when they were available, or gave generously of their time to be on hand at the mines when treasures were dug out. And most of these museum collections were given to the institutions by the Morgans, the Vauxes, the Bements, the Roeblings, and others.

On the other hand, the museums have been one of the chief influences that have made more collectors. They are our primary educational institutions for mineral collectors, inasmuch as only at the college level, in most states, is any geological or mineralogical teaching available. But at the museum the school boy and the adult alike may admire beautiful specimens, learn what his own specimens are, and hope some day that he will own something as fine as he sees in the cases. Furthermore, these collections serve the scholar as research material, where he may study a suite of minerals of the same type or from the same locality as he could never hope to do anywhere else.

This association of the museum and the mineral collector is a happy symbiosis, but there are signs and dangers in the association that can stand some pointing out. First of all, any collector should think twice before he bequeaths or gives his collection to a museum. The primary joy in mineral collecting is in the physical possession, the ownership, of a choice specimen, one which the collector can handle, can show to his friends, can compare with others, and can learn to know almost as he would know a neighbor. The collector who is disposing of his collection, by will or otherwise, should consider whether his specimens are of such unusual importance that they will be of permanent value in a museum. If they are not of that priceless merit, he will do better to sell or give them away, so that some other collector may experience the same joy in ownership that he has had.

Much of the giving to museums is mere desire to show off or to perpetuate the collector's name after his death. Such vanity gifts are of dubious morality and, when made to a major museum, are most likely to receive little attention and no display. Anyone who has ever been in the reserve stacks of a big museum knows that it will have four or five times as many mineral specimens in its lockers as will be on display, and most of these reserve specimens never will see the light of day.

It is not unreasonable to suggest that, inasmuch as the museums have benefited greatly in the past from the generosity of collectors, that they give or sell some of their great surplus of reserve specimens to mineral clubs and to individual collectors, who can make use of them.

Furthermore, this is becoming even more pressing because many of the mineral collections are becoming increasingly difficult to see. In Chicago, for example, the University of Chicago has abandoned all public display of minerals and now has its collection in drawers available only for study by scholars. The Chicago Natural History museum is making its collections more and more educational, and is retiring to the stacks the great mass of specimens formerly on display. The displays there are much better for the general public but not for the moderately advanced collector. And in some museums, such as that of the Academy of Natural Sciences in Philadelphia, the display of some of the

(Concluded on Page 39)

MEET THE AUTHOR

EDMOND PRESTON HYATT

Edmond Preston Hyatt, author of our excellent feature article on "Clays" appearing in this issue of *Earth Science Digest* is instructor in geology at Brigham Young University, Provo, Utah, specializing in the nonmetallic minerals.

Professor Hyatt is eminently fitted for this position, having completed his Bachelor's and Master's degrees in Ceramic Engineering at the School of Mines, Rolla, Missouri. Following his graduation he was engaged in Ceramic research at University of Utah, Salt Lake City, working on naval ordnance and other projects.

He was graduated 'with honors,' and has received further recognition in being elected to membership in such outstanding educational fraternities as Tau Beta Pi (Honorary Engineering), Phi Kappa Phi (Scholarship), Sigma Xi (Research), and Keramos (Ceramic Engineering).

Professor Hyatt was born in Joliet, Illinois, in 1923, where he attended the public schools. His earliest interest in the Earth Sciences was stimulated by membership in the Joliet Junior Mineralogist Society, of which he was President. He was also a charter member of the Midwest Federation of Mineralogical Societies.

He is a member of the Mormon Church, and active in Boy Scouts leadership, as well as in the various professional societies to which he belongs. In 1945, he married Ora Mae Sorensen, an Army Nurse, and they are now the happy parents of a family of five children of whom they are very proud.

ARKANSAS BAUXITE MINES REJUVENATED

Aluminum, a metal which as recently as fifty years ago was considered to be more or less of a novelty, is now a vital necessity in our modern civilization. The principal source of this important metal is the mineral, bauxite, a hydrated aluminum oxide ($Al_2O_3.2H_2O$), usually occurring in earthy masses of white to yellowish-white or reddish brown color.

The state of Arkansas has long held the enviable position of having produced the major portion of the bauxite used in this country, 97% according to recent U. S. Bureau of Mines figures. So great has been the drain upon this source of supply however, during recent years, that most of the high grade ore has now been mined out and so we have had to rely upon large imports of bauxite from foreign lands to fill the rapidly growing demand.

During the early stages of World War II, when German submarines were sinking so many bauxite ladened boats from the Guianas, the situation became critical and anxiety over the possible loss of foreign sources brought about the development of a highly technical process for the extracting of alumina from subgrade bauxites which yet exist in abundance in Arkansas, although most of the highgrade ores have been exhausted.

The town of Bauxite, in Saline County

(Concluded on Page 30)

CLAY SCIENCE

by Edmond P. Hyatt, Geologist
Brigham Young University, Provo, Utah

Perhaps to some, clay lacks the color and romance that make agates, fulgurites, and glittering gems so popular. It is one of the purposes of this writing to make professional and avocational Earth Scientists better acquainted with this commonest of all mineral and rock substances.

It is hoped that as "rock hounds" do become acquainted with and begin to collect clays they may help to find new and better clay deposits and also help to extend the knowledge of clay science.

It may be a surprise to learn that clay is truly the most common substance in the mineral kingdom (note: the term 'abundant' was not used). Few soils lack one or more of the dozen or so definite clay minerals and, in fact, few sedimentary rock formations do not contain appreciable clay. Shale, for instance, may be composed largely of clay minerals. While it is true that the earth is largely igneous (heat formed), it is also true that some 80% of the surface of the earth has sedimentary cover. Is there any doubt why the ubiquitous clay should be so common?

Economically speaking, clay also is far from being uncommon. The value of clay produced annually amounts to more than ten times the value of aluminum ore and is actually valued higher than gold ore, $74,000,000 being the value for a recent year.

Commercial clays are usually taken from deposits in which one or more useful clay minerals predominate. These commercial deposits are not as common as may have been suggested above, though there are very few counties in the United States that do not have some clay material.

What is a Clay?

The term, clay, usually means a hydrated aluminum silicate which becomes plastic when wet. Other characteristics such as fine grain size, platy structure and a certain firing behavior may also be included in a complete definition.

More specific, however, is the description of each of the clay minerals of which the gross substance 'clay' is chiefly composed. Over a dozen minerals are included in this group with kaolinite being by far the most abundant and best known. Halloysite is a member of the kaolinite family having the same composition ($Al_2O_3 2SiO_2 . 2H_2O$) but structural differences. Montmorillonite and illite are two important clay minerals of slightly differing composition and structure.

Most commercial deposits contain relatively high amounts of some one of the clay minerals hence the rock sample may be close to pure clay mineral.

Man's unaided eye is unable to distinguish individual crystals of a clay mineral owing to the very small grain size they possess. In fact, it is only with the most powerful of magnifiers, the electron microscope, that man is able to see the shapes of these crystals at all. Since the minerals are so small and the electron microscope is of such recent development, it has been just a few years that man has been able to 'see' clay crystals.

Kaolinite crystals, relatively large and often well formed, are so small that some 35,000 magnifications are required to bring the crystals up to one inch length.

An almost obvious question probably is going through the reader's mind at this point: If the crystals are so small how can anyone study the characteristics as we do so easily with quartz and calcite?

While it is true that some of the crystal properties are obscured by smallness, it is also true that there are other properties and

GENERAL VIEW, CLINTON CLAY PIT, LEHI, UTAH

simple tests which even the amateur mineralogist may use to study the clay minerals. Some of these will become obvious as we proceed.

Modern science uses x-ray and differential thermal techniques and other tools to supplement electron microscopes to learn about these very small but important units of the earth.

A combination of the various techniques tells us much about the nature of the clay minerals. For instance, almost all of these crystals occur as plates very much like those of mica. Kaolinite, in fact, has the familiar hexagonal outline of muscovite.

The property of a clay to become plastic, i. e., sticky when wet, is related to the ability of these peculiar crystals to attract water and to hold those molecules tightly on the surfaces of the individual plates. A substance is said to be plastic if it will flow or is capable of being molded under pressure and if it will retain its shape when the pressure is removed. The ability of clays to become plastic varies widely and recognition of the property is valuable in determining ultimate usefulness of the clay. Some commercial clays are mined because of their plasticity while others may be used in spite of, or because of the absence of plasticity.

One important clay group, montmorillonite or bentonite, gains much of its prominence because not only does it become very plastic but often it may actually swell as much as 10 times its volume when wet.

Firing behavior of a clay is of considerable commercial importance as this raw material is the chief ingredient of the great ceramic industry which fires clay to make such articles as fall within the groups of brick, pottery, porcelain, sewer pipe, tile, abrasives, furnace linings, etc. The items of note under firing behavior include temperature of melting, color of fired piece, amount of shrinkage during firing, etc.

Whence Came Clay?

The earth is considered by geologists to have been entirely molten at one time and as it cooled, crystals, large and small, formed along with some glass and the liquids and gases with which we are familiar. Before the agencies of weathering and erosion commenced their work the solid portion of the earth was composed of igneous rock. No soils, limestone, salt, gypsum or agates were present on the earth. These substances came into being after weathering was under way and after sediments formed; they are examples of the sedimentary rocks.

Clay belongs to the great group of substances which were formed secondarily, i. e., they are the decomposition or alteration products from some primary parent material. Usually this is crystalline igneous rock.

The crystals of individual clay minerals form and accumulate as deposits by one or a combination of the following methods: 1) decomposition of parent rocks; 2) alteration of parent rocks by various agents; 3) transportation of the weathered products and 4) alteration and/or weathering of the transported products.

Clays which have formed in the place where they are now found are said to be 'residual' and the outline or structure of the deposits take on the appearance of the parent rock. As contrasted to this class there is that which includes all clays which have accumulated by one or another of the more common methods of sedimentation, hence the type, sedimentary clays. These are also called by some, secondary clays.

Weathering of the Crystalline Rocks

Virtually any rock containing abundant silica (SiO_2) and alumina (Al_2O_3) may decompose under the influence of oxygen, carbon dioxide, and water and under certain physical-chemical conditions (chiefly, variations of temperature, acidity, and pressure) to form crystals of the clay minerals. The type example is that of orthoclase feldspar ($K_2O.Al_2O_3.6SiO_2$); the potash is removed by the action of water containing carbon dioxide which makes a very soluble potassium carbonate; some of the silica is removed by that same slightly acid water; the remaining atoms attract water molecules, some of which become part of the new crystals of kaolinite ($Al_2O_3.2SiO_2.2H_2O$).

Other minerals chemically and structurally similar to orthoclase may decompose in like manner to form kaolinite or other clay minerals.

A rock containing appreciable feldspar such as a pegamite may, if conditions are just right for a long time, produce a large vein containing much relatively pure clay; if the chief clay mineral is kaolinite the rock name given is kaolin.*

In the United States there are many im-

* KAOLIN, by the way, is from the Chinese and refers to the location of an anciently famous deposit which was an original source of the 'china' or porcelain of the early traders.

WORKING FACE, CLINTON CLAY PIT, LEHI, UTAH portant deposits of clay which have had an origin like the ones described above. The greatest of these lie in a belt, paralleling the Appalachian mountains from Vermont to Georgia, with those of Carolina being most important.

Volcanic ash of igneous origin may also be decomposed and yields chiefly the mineral montmorillonite to make deposits of the clay, bentonite.

Alteration of Igneous Rocks

This method of formation as contrasted with the weathering group above involves changes in the mineral composition of the igneous or other rock as a result of chemical action of hot water which rises from deep seated magmas, i. e., molten rock. The water is impure in many ways and may cause important mineral alterations. Minerals formed by such hot water action are said to be of hydrothermal origin. Many clay mineral occurrences have been noted for this method of formation but few have become commercial. Large quantities of halloysite, formed near metallic ore minerals, are being mined in Utah.

Transportation of Weathered Products

Water and wind are both great agents for the transporting of the loosened products of decomposition and disintegration and within certain limits they do an excellent job of sorting the 'chaff from the grain'. It is due to their work that we have gravel deposits here, sand deposits there and, of course, clay deposits elsewhere. Commercial clays within this group are the most varied both as to size, extent, quality, locality and geologic age. The list is virtually endless but a few examples may show the great variety.

Transportation of the residual Appalachian kaolins by stream into lagoons and extensive coastal swamps gave us the great secondary clay of the Piedmont in the southeastern states.

The collection of silts containing some clay in large shallow basins produced extensive shale deposits over the country.

Very fine clay minerals, chiefly kaolinite, were concentrated in swampy depressions and formed the ball clays of Kentucky and Tennessee.

Other fine kaolinite was deposited, apparently with alumina gel, under swamp conditions not greatly unlike coal formation and the result has been, in a few places, very highly heat resistant deposits of 'fire clay'.

Alteration of Sedimentary Rocks

There are at least two ways clays may form from sedimentary rocks. First of all, the sedimentary rock (initially one of low clay content) may be weathered much like the igneous rock mentioned previously. If feldspar or similar silicate is abundant the product may be high in clay.

Another important method of clay concentration involves a more-or-less soluble sedimentary rock, like limestone which was formed in the sea and with which was accumulated only a small portion of the clay minerals. Subsequent dissolving of the calcium carbonate has left beds of another type of 'residual clay'.

Deposits of clay vary even more than the modes of occurrence listed previously would indicate. Such variables as type and grain size of the clay minerals, relative purity of the clay and nature of the contaminating impurities such as lime, iron oxide, alkalies, quartz, etc., all influence the quality of the bulk clay and determine the use to which it is put.

Uses of Clay

Pottery, porcelain, tile, sanitary ware and other so-called "white-wares" require light-firing kaolins. Plastic sedimentary kaolins of Florida and the very plastic ball clays of Kentucky and Tennessee are used with the relatively low plasticity residual kaolins of the southeast.

Furnace lining and other refractory materials must withstand high temperatures for which only the fire clays, like those in Missouri and Pennsylvania, are well suited.

Sewer pipe, building brick and other structural clay products can be made successfully by using shales and other low

AUTHOR HYATT Operating Electron Microscope.

grade clay deposits which may contain much silica and iron oxide; the latter plays a major role in coloring ceramic products.

The above uses are all illustrative of the ceramic industry in which high temperatures (to more than 3500° F) are employed to make the hard and durable products everyone uses daily.

Rubber, paper and some other products use clay as a filler, extender, or coating. Large quantities of the Carolina kaolins are used for this purpose. The paper of this page has clay in its surface.

Bentonite, because of its swelling characteristics, finds important use in oil well muds where it helps to suspend the cuttings. Farmers in the west use it for line irrigation ditches and to make a water proof chicken house roof.

Halloysite, bentonite, and some others are treated to become catalysts in the petroleum cracking operations.

Collecting Clays

Specimens of the clay when properly identified, classified and labeled become important parts of any educational or recreational rock or mineral collection. The actual collection may be made in the field at known clay pits or at other locations where clay may be discovered. Some mineral dealers are able to furnish specimens of the various clay types such as have been mentioned in this article.

Actual samples from adjacent deposits and often also from different parts of the same pit will show wide variation so a complete collection must contain many specimens, while a representative collection may include as few as ten or twenty types.

Identification, classification and labelling can conveniently be on the basis of either use of the clay or geologic mode of occurrence. Examples of the 'use' category may be sewer pipe clay, paper clay, china clay, bentonite for catalysts, foundry clay, fireclay, etc. A disadvantage of this method is that in some places the same clay may have a number of diverse uses.

Classification by mode of occurrence is based on the origins discussed earlier and may include such types as, Florida sedimentary kaolin, Kentucky ball clay, Illinois coal measure clay, South Dakota bentonite, Utah halloysite and Ohio shale.

Color of specimen, presence or absence of lime (acid test) and mineral associations may also be indicated for each specimen and, of course, locality of collection should be shown.

Complete and accurate mineralogical identification can be accomplished, as indicated earlier, only by use of tools which mineralogists in some universities and research laboratories have at their disposal. A nominal charge would usually be made for such services.

Specific evaluation of a clay with an eye to possible economic use can be accomplished at many ceramic plants, schools and research laboratories. Frequently this also involves nominal charges for labor and supplies used in the testing. One interesting collection may include a specimen of raw clay and, in the case of the ceramic clays, a piece of the clay which has been fired to

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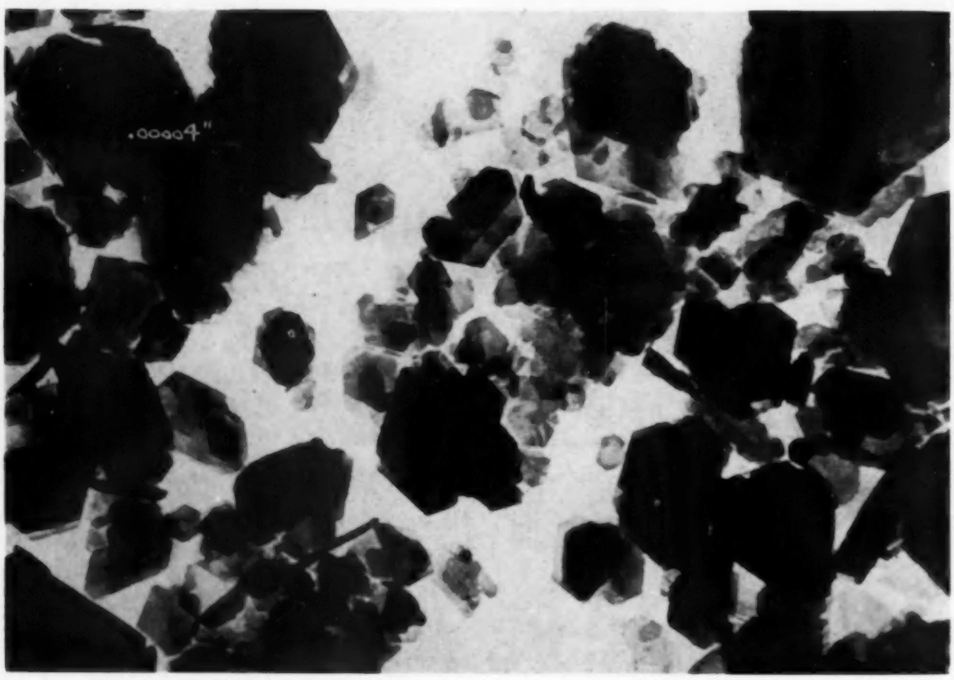


KAOLINITE, 20,000X, Made with RCA Electron Microscope. Courtesy: American Cyanamid Company.

Paste—The World's First Imitations

Dr. J. Daniel Willems

It was late afternoon when the sturdy ship slowly turned from midstream in the great river Belus toward the sandy shore. Coasting in, the captain, an old weathered saltwater sailor, headed for a suitable place for a landing. The ship was down by the gunwales with a cargo of Natron (sodium carbonate), for it was in the lively trade of the Phoenicians, then the world's most active navigators and traders (Ezekiel, Chapter 27). Natron was good for making soap, but, better than that, it could also be traded for precious stones—emeralds, corals, and agates.

Soon the sailors were ashore seeking a place on the broad beach of pure white sand for a campfire. Stones were needed for building a crude and temporary hearth. The season was late autumn, about the year 1000 B.C.

The ingenious men, not finding any stones on shore for making their cooking place, went back to their ship for some of the natron blocks in their cargo. These they set into the sand and built their fireplace. Then they lit the fires. In a short time the blocks began to melt from the heat of the fire and the heated alkali flowed out upon the sand where the substances fused into clear glass.

Thus the art of making paste—imitation gems—was discovered.

It is in this way that a writer of nearly 3000 years ago might have reported the fascinating event that started a fraternity of deception which survived and thrived until our present day.

The Phoenicians were resourceful and ingenious as inventors in many fields. They were also the world's boldest seafarers and leading merchants. Even before this time they had been able to produce purple dyes from the juices of shellfish found along certain shores during their vast travels. Green dyes also appeared, but their origins are less clear. From using these dyes on their textile fabrics, the restless Phoenicians went to using them on paste, producing various ornamental objects, such as imitation precious stones, beads, coins, sculptures, etc. These they spread far and wide in their trading with other peoples.

In spite of this intriguing story there are those who bring forth evidence that the Phoenicians, after all, did much borrowing and appropriating from other peoples, usually improving on the originals. There is positive evidence that the early Egyptians satisfied the universal craving for personal adornment, by beads, bracelets, and necklaces made from shells, seeds, and pretty pebbles. These they soon replaced by replicas in terra-cotta, and later by paste. As long as 5000 B.C., long before the Phoenicians became the world's greatest tradesmen, a vitreous, more or less opaque, paste was used by the Egyptians. This they used along with their natural stones, such as lapis lazuli, turquoise, and malachite. But the Egyptians stayed at home and they were poor advertisers.

It can be said, however, that the Phoenicians were the distributors of the goods of trade, and after they once had the trick of making paste, they sold and traded it far and wide. Where the Egyptians kept their paste at home, eventually to bury it with their kings and queens, the Phoenicians manufactured it wholesale and sent it around the then-known world.

Paste soon began to play more and more important parts in the early decorative arts, and the early Greeks ranked it with their precious stones (Theophrastus). Numerous examples of fine objects of jewelry dating from this period as well as others, can be seen in the great European museums. Some date back as far as 1500 B.C. Many are set in fine metals, decorated with filigree work, for rings, bracelets, and necklaces. This high esteem is quite understandable, for the beauty of the clear gem stones with their refractive and reflective play of light was not known until the discovery of the modern scientific method of faceting in 1456 A.D.

Paste was used throughout the early Christian centuries quite freely and with minimum connotations of deceit, even in the jewelry of royalty, including their crowns. An outstanding example is the "Treasure of Guarrazar." This consists of a hoard which was dug up by accident in a place by that name near Toledo, in Spain, in 1858. There were found eight gold crowns, all richly ornamented with numerous precious stones and paste, more or less indiscriminately mixed and placed. The most famous of these crowns was that of King Reccesivinthus, now in the Cluny Museum of Paris.

The Alfred Jewel, a masterpiece of Anglo-Saxon goldsmiths' work, dates back to 906 A.D. when the great King Alfred had it specially designed and made for himself. It is one of the great treasures of English history. Several parts of this jewel, including the figure representing Christ, are made of richly colored paste. This fact is frankly admitted and gives proof that paste was ranked with precious stones. Throughout all these centuries the art and method of making these highly prized objects were only very rarely recorded or revealed.

Paste in more modern times has often been used by the owners of expensive and beautiful articles of jewelry to imitate their pieces and thus confuse those who would covet the precious genuine ones. No jewelry stone has been immune from imitation by paste, not even the beautiful opal. Contemporary paste is, however, tawdry and pretentious, and usually far below the quality of the antique pastes. No honor comes to the artist who produces modern paste, even though his art is well admired.

The modern makers of paste remain obscure by their own preference, perhaps because of the implication of fraud.

C. Plinius Secundus (Pliny the Elder), in the 37th Book of his Natural History of the World, written in 77 A.D., stated it thus: "Men have devised to make Sardonches by setting and glewing together the gems named Ceraunia, and that so artificially, that it is unpossible to see therein man's hand; so handsomely are couched, the blacke taken from this, the white from that, and the vermillion red from another, according as the richnesse of the stone doth require, and all those in their kind most approved. Moreover, there be in my hands certaine bookes of authors extant, whom I will not nominate for all the goods in the world, wherein is deciphered the manner and means how to give the tincture of an Emeraud to a Crystall, and how to sophisticat other transparent gems."

(Continued from Page 4)

the fun of having a jeweled Christmas tree. After a night of glory on the Club's Christmas tree, most of the begemmed ornaments are displayed for the rest of the yuletide season on the members' own trees.

COVER PHOTO

Our November cover photo, in keeping with the Christmas spirit, shows the "Jeweled Christmas Tree" displayed at the Christmas Meeting and party of the Chicago Lapidary Club at the Grand Crossing Park Field House in December, 1951. This original idea suggested by Miss Bernice Wienrank attracted wide attention throughout the country and has been successfully used by many other Clubs.

Shown in the picture are Miss Gladys Board, Christmas Tree Committee Chairman, and the late Mr. James L. Kraft, who was guest speaker of the evening. Mr. Kraft was in failing health at the time and it proved to be the last major address ever made by this great humanitarian and distinguished authority on Jade. None who were present will ever forget this memorable and happy occasion.

RARE FOSSILS DISCOVERED IN KANSAS

PREHISTORIC LIZARDS OUTDATE DINOSAURS

by John Watson, Wichita, Kansas

Complete fossil remains of rare, prehistoric lizards, which make dinosaurs look young enough to almost seem modern, have recently been unearthed about eight miles northwest of Garnett, Kansas, by scientists from the University of Kansas, at Lawrence.

In revealing the rare scientific finds to the public, the Kansas geologists pointed out that these lizards lived some 250,000,000 years ago, while dinosaurs date back only about 60,000,000 to 190,000,000 years.

The discovery was made near the banks of Pottawatomie creek in Anderson County, and the site is said to mark the only known spot in the world where a complete fossil of this prehistoric reptile has been found.

Dr. Frank E. Peabody, assistant professor in the department of Zoology, at the University, who directed operations at the site during the summer of 1953, stated that four complete skeletons, and parts of two others have been uncovered.

Will Be Encased

The fossils which were imbedded in relatively thin layers of rock, (shale) are quite fragile, and will soon be encased in a plastic like substance, for permanent preservation, upon their removal to the University museum.

Dr. E. R. Hall, chairman of the department of zoology of Kansas University (kneeling in the background). Dr. Frank E. Peabody who is responsible for the undertaking, looks on while students and helpers tediously excavate remains of fossil lizards. (Photo by Gordon Adkins)

At the time of their natural preservation, this area of Kansas was part of a huge inland sea which periodically grew larger, and then smaller, according to climatic and other conditions which prevailed at the moment.

According to Dr. Peabody, "Accidental deaths in or near a river resulted in rafting of numerous carcasses of the reptiles, as well as arthropods and plants, down stream to brackish waters of a quiet marine embayment or lagoon.

"Here the fine sediments, transported at least in part by the river, fouled the lagoon, impoverished the indigenous fauna and marine invertebrates, but simultaneously excluded scavengers and preserved both indigenous and introduced organisms."

While the paleontologists of the University have known for nearly 25 years that these 250,000,000-year-old lizards once lived in what is now Anderson County, it was not until now that complete fossils of the reptiles have actually been discovered. Only fragments had been found prior to this time.

The first fossiliferous shales near Garnett, were originally discovered in the course of geological mapping in 1931. They were exposed in a roadcut near the north bank of Pottawatomie creek and about one-quarter mile from the site where the complete fossils were found.

Plants Found

The first finds were fossil plants which aroused immediate interest among paleontologists because they indicated another age entirely than that in which dinosaur were known to have lived. Additional finds were made in 1936 and in 1945, substantiating the theory.

When Dr. Peabody joined the university in 1948 he became interested in the reptillian remains in Anderson county because of their age and rich faunal and floral associations and obtained permission to take over and enlarge the study of the reptiles.

As a result of his findings and studies, he published a paper, about a year ago, which attracted wide attention in the scientific world. This caused Dr. D. M. S. Watson, famed paleontologist from the University of London, to make a special trip to the University of Kansas campus to examine the specimens unearthed. Professor Alfred S. Roamer of Harvard also paid a visit to the university, for the same purpose.

These findings, it seems, were of prime importance to these men of science, who specialize in the study of life which existed upon the earth many hundreds of millions of years ago.

Studies Simplified

Now that several complete fossils of the lizard have been found, these experts no longer have to guess about the characteristics of these prehistoric reptiles, for they now have the entire skeletons, well preserved, upon which to work, compare, and complete their studies.

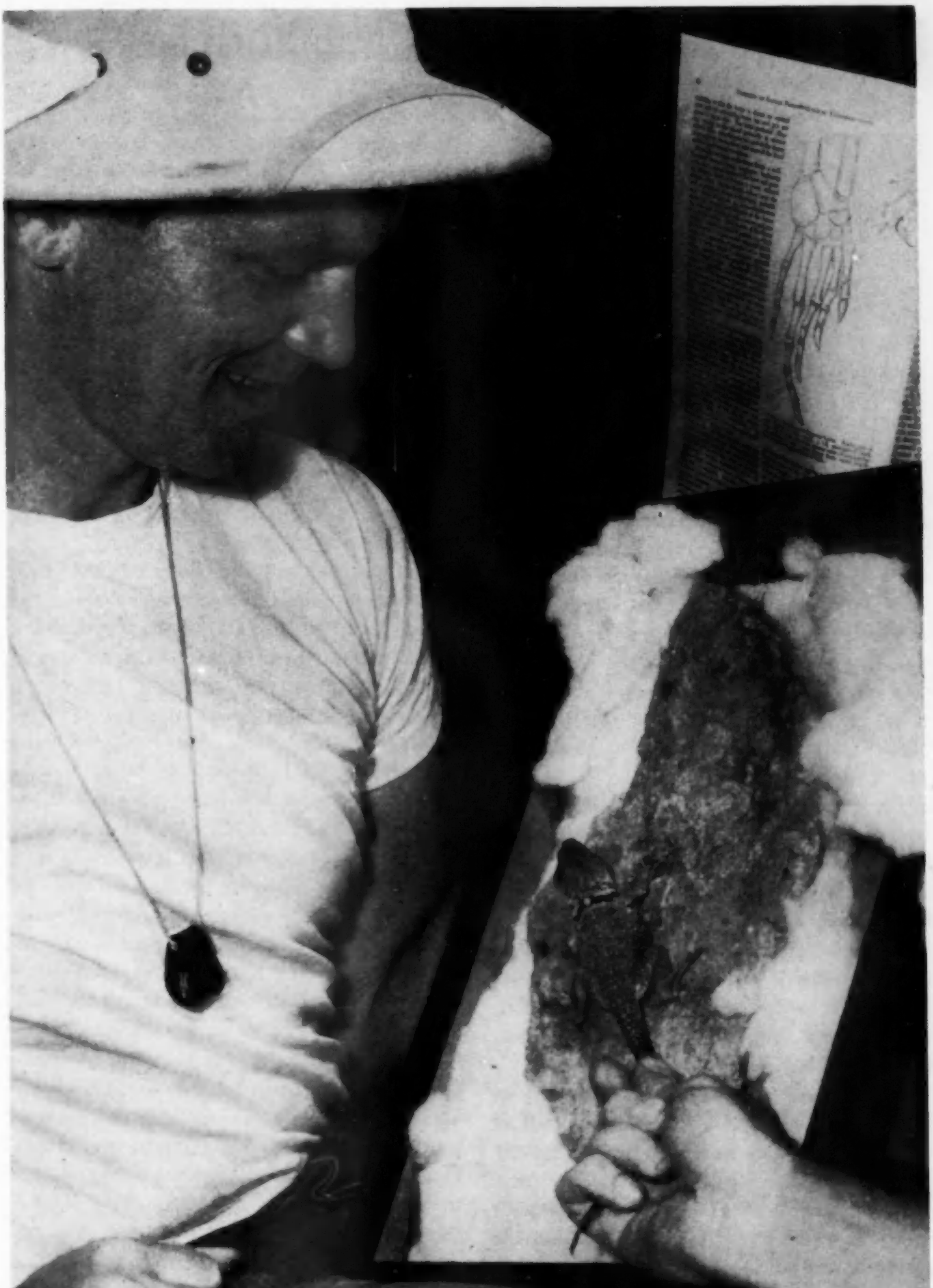
Dug up from what is known to geologists as the Pennsylvania strata, these lizards apparently were agile reptiles living among conifers and ferns of the coal measure period, states Dr. Peabody. He has given them the scientific name, Petrolocosaurus Kansensis. A real "Jayhawk" jawbreaker.

He describes them as being about two foot long—a rather small, slender, terrestrial reptile with well-developed limbs and a long tail somewhat resembling similar creatures today. Previous studies have shown that it was a casual climber, if at all, and probably was not even semi-aquatic. They were probably one of nature's first attempts towards evolving a "fast-moving land vertebrate." The animal had a long fore-arm and slim and a shorter upper arm and thigh.

May Be Grand-daddy

Dr. E. R. Hall, chairman of the department of Zoology at Kansas University and director of the University's museum of natural history, compares the significance of the discovery with the finding of the primitive fish off the coast of Madagascar,

(*Concluded on Page 29*)



"GRANDPAPPY AND SON" — Imbedded in this piece of shale-rock found near Garnett, Kansas, are the fossil remains of a lizard dating back 250,000,000 years ago. The two-foot long prehistoric reptile may have been the "granddaddy" of the live-collared lizard about six inches long, which claws on the slab, while Victor Hogg, an artist with the Kansas University museum of natural history looks on. (Photo by Gordon Adkins. Wichita Eagle Staff)

WHERE WAS THIS PIONEER GOLD MINE?

(Prize question for November)

This episode begins in the decade previous to the outbreak of the War between the States, when we see two men driving a yoke of oxen pulling a heavy wagon loaded with a variety of household impedimenta, slowly wending a tortuous course southwestward from the Mississippi River. Evening overtaking them as they neared an isolated grove, they decided to camp there for the night. Up at dawn, the elder of the two brothers (we will call his name John) thought that some scouting should be done in order to find the best way to reach their claims, which had been located the year before.

After a hasty breakfast, John saddled their riding horse and set out toward a line of trees that loomed large in the southwest. Returning by mid-afternoon, he reported that they were on the right track and would no doubt reach their claims the next day. Quickly eating a lunch of corn bread and broiled venison, the two men yoked up the now refreshed oxen, and again the wagon rolled across the trackless prairie toward the declining sun.

Arriving at their claims, the two brothers were confronted by the seemingly herculean task of building a new home in a "primeval forest." Not at all daunted by the enormity of the task, they set to work and within a few weeks had erected a log cabin near a spring, and provided shelter for their stock.

Even pioneers at times experience the necessity of making an occasional contact with the outside world, in order to replenish supplies of such items as lead, powder, salt, etc. After talking the matter over, the brothers agreed that it would be a very wise precaution to stock up on these supplies while the weather yet remained open. Hank again was elected to remain at the claims, while John saddled up the riding horse and set out for Winona, where passing settlers had told him that such supplies could be purchased. John fully expected to return within a week, but as a matter of fact, he did not see the claims again until after nearly two weeks had elapsed.

In the meanwhile Hank had been far from idle. With the aid of the oxen he had pulled up to the cabin a huge pile of firewood and for good measure he had scythed a considerable amount of slough-grass hay with which to thatch the shelter for the stock and to provide winter feed for them.

The weather remained very hot and at the close of the day's work Hank would go down to the river about a quarter of a mile from the cabin and have a "wash-off." At the point where he approached the stream there was a sharp dog-leg bend, where the river flowing from the south, impinged against the base of the hill, turned and flowed eastward. Above the bend, the river was quite shallow, flowing along in a series of ripples caused by sand and shingle scattered over the bedrock.

Somehow this rippled area had a deep fascination for Hank, but he never had time before to fully look it over. He resolved to follow it up to the slack-water on the opposite side of the valley. As he waded along in the shallows, stopping from time to time to examine a rock or even the sand, it suddenly struck him that this might be gold-bearing sand. At least, it had some of the ear-marks of gold sand, and the idea became more insistent, the farther he proceeded upstream.

He knew that the way to settle the matter was to pan some of the sand—both he and John had learned that little trick some years before from an old miner back from the West. Hastily donning his clothes he went to the cabin and brought out the dough pan, the only utensil they had of anything like the proper size and shape for the purpose. With this and a shovel, he returned to the ripples, where he proceeded to wash out some of the sand and gravel from the bed of the stream. His efforts met with gratifying success—there

(Continued on Page 33)

ROCKHOUNDS!

Let's Get The Christmas Spirit!!!

What are your plans for Christmas? Let's get the Christmas Spirit, "rock and mineralwise" and make it a holiday event long to be remembered. The drawing below, we hope, will give you just the inspiration and ideas you may need to put it across. Be sure to read Bernice Wienrank's splendid article on the "Jeweled Christmas Tree" commencing on page three of this issue of the Digest, and then get busy on your planning at once.

Truly, what better or more appreciated Christmas gift could you make to your wife or husband, or to your son, daughter or friend than a good book on some phase of rockhounding, or a fine mineral or polished specimen, or some piece of equipment, large or small, much needed in your home lapidary shop.

Another suggestion we should like to make, which won't cost you much, (about the price of a picture show), would be a year's, or three years' subscription to EARTH SCIENCE DIGEST. What could be nicer than to be reminded six times a year by the recipient of your gift, each time the Digest arrives in the mail? We feel that the Digest needs and deserves more readers and this could be your Christmas Greetings to the management who are trying so hard to serve you by putting out a good magazine.

Our special Christmas offer, five subscriptions for the price of four, including your own, holds good until January 1st, 1954, SO WHY NOT TAKE ADVANTAGE OF IT AT ONCE? It is so easy to put a thing off and forget it, and later be sorry. A special Christmas Card will apprise the subscribers of the donor to whom they are indebted for the gift.

The EARTH SCIENCE DIGEST
STAFF WISH ALL OF OUR READERS
a very MERRY CHRISTMAS

A LETTER FROM ROBERT B. BERRY

AN ENCOURAGING LETTER received by the staff of EARTH SCIENCE DIGEST, from Mr. Robert B. Berry, co-editor and founder of the magazine, in Omaha, Nebraska back in 1946. Thanks Mr. Berry for generous praise of our efforts. It is appreciated.

Dear Mr. Allaway:

I would like to take this opportunity to congratulate the staff of the Earth Science Digest for the excellent job they are doing with the magazine. When Bernard Bennett and I founded the Digest in 1946 we had no idea that the magazine would develop into the splendid little publication it is today. You people are doing a great job with it. Keep up the good work.

It's my hope that all of the Digest's old subscribers and advertisers will continue their support. They couldn't invest their subscription or advertising dollar in a better way.

With best regards, I remain,

Yours very sincerely,
Robert B. Berry

5040 Corboy Street,
Omaha 4, Nebraska

The "Cashion"

Kingfisher County, Oklahoma Chondrite (ECN=+977,358)

by H. O. Stockwell
and
Russell A. Morley

ABSTRACT

The Cashion meteorite was discovered by Mr. Prem W. Jech in August, 1936 on his farm, which is located 2¼ miles N. W. of the town of Cashion, Kingfisher County, Oklahoma. The meteorite weighs 5,896.8 grams and has a concave depression on its lower surface in which there are a group of 6 well defined pits. The meteorite has a specific gravity of 3.431, at 22.5° C. with overall dimensions of 192.1 mm. X 155.6 mm. X 101.6 mm. The Cashion chondrite belongs to the class of spherical black chondrites (Csc). The main mass is now preserved in the H. O. Stockwell collection.

The Cashion meteorite was discovered by Mr. Prem W. Jech, on his farm, which is located 2¼ miles N. W. of the town of Cashion, Kingfisher County, Oklahoma, in the Kingfisher quadrangle, Logan Township, on the S. W. ¼ of Sec. 23, T 16, R 5 W. The longitude of the place of find is approximately W. 97° 42′ 12″ and the latitude is N. 35° 50′ 52″. This location has the equatorial coordinate number (ECN), =+977,358. The meteorite was discovered by Mr. Jech in August, 1936, while he was engaged in plowing his ground in preparation for planting fall wheat. The land in this area is slightly rolling and almost devoid of rocks; this feature along with the strange appearance of the specimen itself, very likely led Mr. Jech to suspect that he had found some kind of an Indian artifact. The strange rock was taken to the Jech home where it remained until December 4, 1951.

While returning from the last of three unsuccessful field trips in search of the Moore-Norman, Oklahoma meteor of November 5, 1951, Mr. H. O. Stockwell stopped at the town of Kingfisher to purchase gasoline. Here he met Mr. Jech, a local farmer, who became curious and inquired about the strange machine which Mr. Stockwell had strapped to the top of his car. On learning that it was an electronic device used to recover meteorites he began at once to describe an odd shaped rock which he had plowed up on his farm back in 1936. He went on to describe, in his own words, the deep thumb-like depressions on its surface. His description so nearly coincided with that of a meteorite, Mr. Stockwell decided to investigate. He accompanied Mr. Jech to his home where he examined the specimen and recognized it as an aerolite meteorite, which he subsequently purchased from Mr. Jech for his collection.

The only other meteoric discovery in the area is the Kingfisher aerolite (cl. = black chondrite, Cs) which was found in April, 1951, in the Western part of the county. It is now for the most part distributed; the largest remaining masses are preserved in the American Meteorite Museum and the

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EARTH SCIENCE QUIZ NO. 9

TEST YOUR KNOWLEDGE! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock-hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect.

a.—(1) aragonite	e.—(1) gusher	i.—(2) scoria
b.—(1) amethyst	f.—(1) cat's-eye	j.—(3) carbuncle
c.—(1) barite-rose	g.—(2) cairngorm	k.—(3) boose
d.—(1) meteorite	h.—(2) amalgam	l.—(3) kidney-ore

(for answers see page 30)

Fig. I. — THE CASHION METEORITE

H. O. Stockwell collection.

The Cashion meteorite is partially covered with the original black fusion crust, the remaining portion of the surface has been oxidized to a reddish-brown color (*Klincksieck et Vallette color code # 85). The upper face has several cracks appearing on the surface, one of which has a maximum width of 3 mm. and a visible depth of 13 mm. Two small fragments chipped from one side of the meteorite show clearly the marks where the plowshare struck. The meteorite has a total weight of 5,896.8 grams and when viewed from the upper face (Fig. I.) it gives a rather smooth rounded appearance. The lower face has a concave depression measuring 143.3 mm. in greatest diameter with a depth of 28.9 mm. The center of the depression has a group of 6 well defined pits (see Fig. II.). The aforementioned physical features combine to produce a most unique appearing specimen. The overall dimensions of the Cashion meteorite are as follows: length, 192.1 mm.; width, 155.6 mm.; thickness, 101.6 mm. The specific gravity, as determined by aid of a precision Jolly balance, is 3.431, at 22.5° C.

The data used herein were derived from a study of two specimens taken from the H. O. Stockwell collection, bearing the following catalogue numbers; a slice, 30:4, with a weight of 69.1 grams and having overall dimensions of 118.8 mm. X 69.1 mm. X 3.0 mm., and an end piece, 30:1, with a weight of 76.6 grams and having overall dimensions of 95.3 mm. X 62.4 mm. X 13.3 mm. The meteorite belongs to the class of spherical black chondrites (Csc), and is the first of this type to be reported from Oklahoma. The polished surfaces show nickel-iron to be fairly abundant and evenly distributed throughout the mass. The matrix is dark in color with a large number of spherical chondri of various sizes, some of which are lighter in color than the surrounding matrix.

Specimen 30:1, shows a fractured surface with a secondary fusion crust. Several fractures are visible which connect with the outside surface while others are completely internal. The main mass of the Cashion chondrite is preserved in the H. O. Stockwell collection.

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* Code des Couleurs by Klincksieck et Valette, Paris, 1908.

Fig. II. — THE CASHION METEORITE

WOOD FROM NATURE'S DEEP FREEZE

by G. K. GUENNEL, Paleobotanist
Geological Survey — Bloomington, Indiana
(Courtesy OUTDOOR INDIANA)

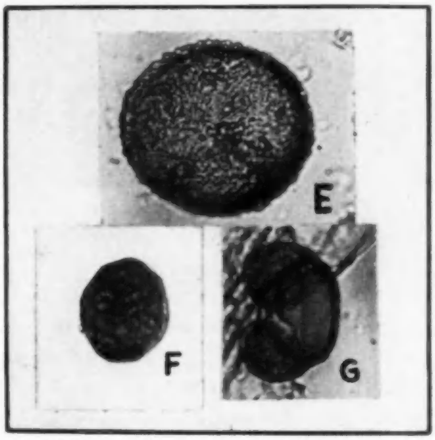
Much has happened to the earth during the two billion years of its existence. Great mountain chains have been created and destroyed; oceans have exchanged places with land masses many times; quakes have shaken the earth, causing its outer shell to crumble; volcanoes still are spewing forth lava. Ice, however, was the important geologic factor in shaping the present structure of the earth's surface.

Much of the northern hemisphere was covered by ice during the "Great Ice Age," more than 100,000 years ago. Human culture and industry have been influenced by the great ice masses of the Pleistocene epoch, the name given by geologists to the period of the most recent glaciation. Glaciers stripped away the soil from some areas, and with it removed most life. In other regions large deposits of rich soil were left behind. In Indiana one can find evidence of the moulding force of ice. Glaciers formed the lakes of northern Indiana, and the present courses of Indiana rivers resulted from glacial action. Moreover, most of Indiana's fertile agricultural soil is glacier-deposited.

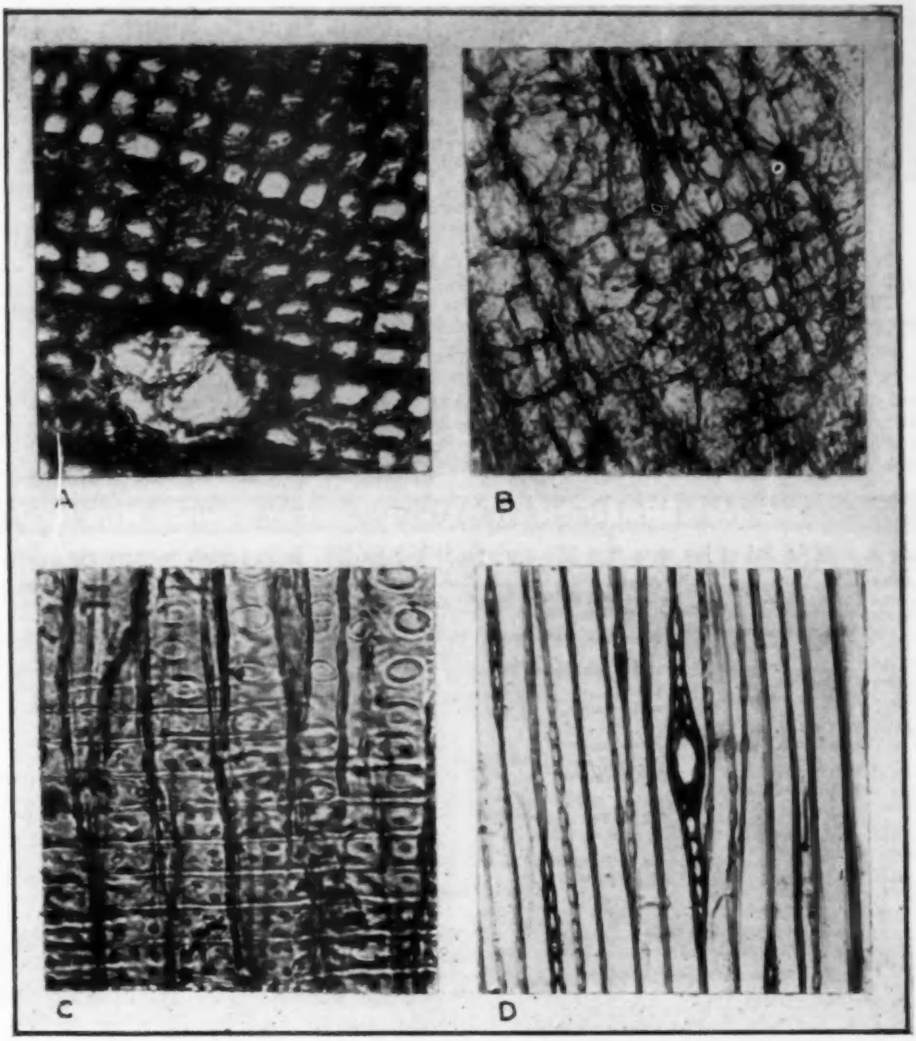
Great Ice Invasions

Two great waves of ice invaded Indiana from the north and the west. The first wave, the Illinoian, covered most of the state, sparing only a triangle in south central Indiana. Two stages of the second wave, the Wisconsin, have been recorded. The first Wisconsin sub-stage, the Early Wisconsin, reached as far south as Indianapolis, whereas the second, or Late Wisconsin, sub-stage covered only about the northern one-third of the state.

Not only do physical features reveal the effects of the glaciation, but also abundant biological remains furnish evidence of the presence of glaciers in Indiana. Antlers of deer and elk, tusks, jaws, and teeth of mastodon, as well as the bones of other animals, have been found. Plant remains, although less spectacular than those of animals, also have revealed much to the scientist who attempts to reconstruct the life of the past. Records of forests which covered much of Indiana after the recession of the ice sheets can be literally "dug up." In peat bogs, which are former glacial lakes, pollen grains from long-forgotten forests have been preserved, owing to their decay-resistant coatings. Much information of the vegetation of the past has been disclosed by microscopic examination of these minute plant remains. One knows, for example, that most of northern Indiana once was covered by dense conifer forests; but, as the climate became warmer and drier, the firs, spruces, and pines gradually were crowded out by an oak-hickory forest. Although fossil pollen is unique in that it enables one theoretically to reconstruct both in kind and in number entire vegetations, other plant remains also can contribute to the store of knowledge of the past.



Pollen grains (magnified 240 times)
E. Hemlock F. Walnut G. Pine



Sections of Pleistocene wood under the microscope (magnified 240 times)

A. Cross section of pine wood ***B. Cross section of walnut wood***
C. Radial section of spruce wood ***D. Tangential section of pine wood***

Buried tree trunks, branches, seeds, leaves, and cones frequently are found by workmen digging wells and drainage ditches and constructing roads.

An investigation of some of these remnants of ancient trees was begun after two small wood fragments were sent to the Geological Survey by a Winona Lake resident. Wood fragments from four other Indiana localities also were collected as specimens. The fragments from Winona Lake, Kosciusko county, were brought to the surface from a depth of 280 feet at the time a well was drilled in that locality. The other fragments examined came from logs which were exposed in stream beds in Parke, Hendricks, Marion, and Shelby Counties.

Microscopic Examination

In order to study wood under the microscope, one must cut the sections so thin that they become translucent. This cutting is best accomplished with the microtome,

(Continued on Page 26)

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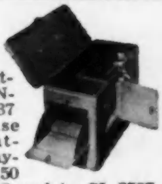

Contains special battery circuit for MINERALIGHT SL-2537 or SL-3660. Case holds lamp, batteries, built-in daylight viewer. $19.50 (Plus Bats. $5.00) Complete: SL-2537, 404 Case and 2 Batteries $64.00.

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Completely self-contained, battery operated, weighs only 3¼ lbs. $39.75 plus battery (90¢)

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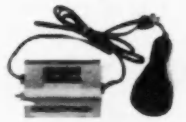

Has bulb rated at 1000-2000 hours of use with 90-day guarantee. Includes a transformer with switch for continuous high efficiency. Price $19.50. Model H is similar, same bulb, except has resistance cord instead of transformer. Approximately ½ the intensity of the TH. $12.50

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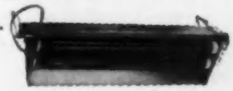

Some materials fluoresce to short wave lengths and some to long wave lengths. Others will react to both wave lengths but with different color responses. Although practically all commercially important minerals (the ones that have real monetary value) are activated by short wave, many collectors specialize in the more unusual long wave minerals.

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3840 26th Ave. So., Minneapolis

MISSOURI
Asterley Ozark Shop
U.S. Hwy 61-67, De Soto

Craven's Diamond Shop Co.
2008 Bryant Bldg., Kansas City

Cy Miller
110 E. 13th St., Kansas City

MONTANA
Yellowstone Agate Shop
Box 4, Hiway 89, Livingston

NEBRASKA
Hastings Typewriter Co.
518 W. 3rd St., Hastings

NEVADA
Toiyabe Supply Company
Gabbs

Woodfords Cash Store,
Woodfords, Calif.,
P.O. Gardnerville, Nev.

Arthur C. Terrill
15 Water St., Henderson

Rock Hollow,
Last Frontier Village
Las Vegas

Commercial Hardware Co.
500 E. 4th St., Reno

Nevada Gem Shop
335 East 4th, Reno

Nevada Mineral Laboratories
336 Morrill Ave., Reno

Tonopah Studio
P.O. Box 331, Tonopah

NEW JERSEY
Para Laboratory Sup. Co.
221 N. Hermitage Ave., Trenton

Westfield Lapidary & Sup. Co.
309 Hyslip Ave., Westfield

NEW MEXICO
New Mexico Minerals
11003 Central N.E., Albuquerque

Adobe Crafters
Rt. 2, Box 341, Santa Fe

NEW YORK
New York Laboratory Sup. Co. Inc.
78 Varick St., New York City

The Radiac Co. Inc.
489 5th Ave., New York City

Standard Scientific Sup. Corp.
34 W. 4th St., New York City

OHIO
Akron Lapidary Co.
1095 Chalker St., Akron

OREGON
The Rock Market
R. 1, Box 225, Eagle Point

The House of Guns
111 Washington St., Garibaldi

Hodge Podge Agate & Supply Shop
322 Hiway 99 S., Grants Pass

Wrightway Gemcrafters
P.O. Box 4, Hauser

Smith's Fluorescents
Rm. 311-220 S.W. Alder, Portland

Dorothy's Gift Shop
4639 N. Stephens, Roseburg

White's Furniture
1218 M St., Sweet Home

PENNSYLVANIA
Lost Cave Mineral Shop
Lost Cave, Hellertown

TENNESSEE
Technical Products Company
19 N. Dunlap, Memphis

TEXAS
D & B Engineering Co. Inc.
1510 S. 14th St., Abilene

Odom's
Star Rt A, Box 32-C, Austin

Nixon Blue Print Co.
Wilson Tower, Corpus Christi

Greene Brothers, Inc.
1812 Griffin, Dallas

Don A. Carpenter Co.
P.O. Box 1741, El Paso

Bell Reproduction Company
907 Throckmorton, Fort Worth

Ridgway's
615 Caroline St., Houston

Panther City Office Sup. Co.
315 N. Colorado, Midland

Farquhar's Rocks & Minerals
134 Hollenbeck, San Antonio

East Texas Photocopy Co.
308 N. Broadway St., Tyler

UTAH
Dr. H. T. Plumb
2400 Sunnyside Ave., Salt Lake City

WASHINGTON
Fulmer's Agate Shop
5212 Rainier Ave., Seattle

Prospector's Equipment Co.
2022 Third Ave., Seattle

C. M. Fassett Co.,
W. 7 Trent Ave., Spokane

Tacoma Lapidary Sup. Co.
631 St. Helens Ave., Tacoma

WISCONSIN
C-C Distributing Company
3104 W. Vliet St., Milwaukee

The House of Hobbies
721 W. Wisconsin, Milwaukee

The Stones Throw Rock Shop
221 S. Main St., Walworth

CANADA
Riley's Reproductions Ltd.
630 8th Ave. W., Calgary, Alta.

Milburns Gem Shop
1605 Trans-Canada Hwy., New Westminster, B.C.

Cave & Company Ltd.
567 Hornby St., Vancouver, B.C.

Sharpe Instruments Ltd.
6038 Yonge St., Newtonbrook, Toronto, Ont.

ULTRA-VIOLET PRODUCTS, Inc.
145 Pasadena Avenue, South Pasadena, Calif.

(Continued from Page 23)

but often, after the pieces of wood are embedded in paraffin, a razor blade can be used to give satisfactory results. The debris associated with the wood remains also can contribute to identification, as it may contain pollen grains which can be isolated by dissolving the debris in nitric acid. In making wood sections, one usually makes three cuts, one at right angles to the stem axis, which results in a cross or transverse section, and two lengthwise, which yield longitudinal sections. The latter cuts are made along two planes, one along the radius for a radial section and the other at right angles to the radius for a tangential section. Photographs A and B show cross sections and photographs C and D, radial and tangential sections.

The wood of conifers can be differentiated readily from that of deciduous trees. Conifer wood is simple and homogenous and consists of few cell types, as is illustrated by photograph A, a cross section of pine wood from Marion county. As the wood fragments from Winona Lake contain no resin ducts, they are of hemlock origin. Thus, the absence of ducts differentiates this wood from that of other conifers. The Shelby county specimens, which show homogenous wood structure and resin ducts, also are identified as pine. The wood from Parke county, shown in radial section in photograph C, however, is believed to be spruce. The large cells with conspicuous rings (bordered pits) of this specimen are traversed by a ray which runs radially. Photograph D represents a tangential section of pine. In this section the conspicuous body in the center is a ray which contains a resin duct.

On the other hand, the wood of deciduous trees is highly complex, owing to the presence of several kinds of cells, such as tracheids, vessels, fibers, and parenchyma cells. Photograph B, a cross section view of a walnut stem from Hendricks county, shows this complexity.

Pollen grains of hemlock, walnut, and pine (photographs E, F, and G respectively) demonstrate how these small bodies differ in size and shape. Thus, they are useful tools in the study of plant life of the past.

An understanding of the structure of wood and other plant remains can aid one in identifying forest giants of the past, in tracing evolutionary changes, and in determining the rise and decline of tree types.

FINIS. Indiana Outdoor

THE PLEISTOCENE EPOCH

(Editorial Addenda)

The Pleistocene Epoch, or the geologically recent "Great Ice Age," as so many like to speak of it, is one of the most important and interesting subjects imaginable. It is the period of geological time that comes right down into our own back door, and lives with us.

Whether it is entirely past, or whether future great ice inundations may not again push down into the middle latitudes from the far north, is an intriguing question which none of us are at present prepared to answer. Of course, this we would all like to know, but it is perhaps a matter that only time will reveal.

We are aware, however, that during Pleistocene time, beginning perhaps a million or more years ago, several great ice sheets did advance from the north into the midriff of North America, as well as Europe and Asïa, and then retreat (melt away due to major climatic changes), only to reappear again after long intervals of inter-glacial time, during which normal, or almost normal vegetal and faunal life once more reestablished itself in the region.

Work of Glaciers

Each advancing glacier carried down its own great load of mineral substance in the form of clay, sand, gravel, and even larger rock debris (drift materials), to be spread about over the rugged terrain of the region, produced by age long erosion throughout the great preceding period of uplift. These deposits smoothed the land like some great plasterer might smooth the roughened wall.

(Continued on Page 28)

(Continued from Page 26)

And so, it is to these great so called Continental Glaciers that we are indebted for much of our rich fertile soil, and the large areas of highly arable land, which makes the midwest important agriculturally, as the "bread-basket" of the entire country.

The "rock hound," amateur geologist and lapidary also is fully aware that these glacial gravel beds are an important, if not the chief source of his raw cutting materials. In them he may find samples of almost every known rock or mineral which occurs anywhere to the north of us. This is especially true of the harder, more resistant materials, which were best able to withstand the great grinding and crushing power of the pressure, strain and movement of the ice.

To most people now residing in non-mountainous regions, glaciers seem to be a thing of the past, or existent only in some far away northern countries. This is not true, however, as there are many glaciers now existing in Continental United States, and elsewhere even as far south as the equator, in the places of higher altitudes where ample cold and moisture prevail. In northern latitudes glaciers may exist even at sea level.

Something New In Glaciers

We are indebted to our friend Victor Shaw for an interesting item appearing in a recent issue (9/26/53) of the Los Angeles "Times" concerning a new glacier discovered recently on Mt. Stewart, which has proven to be at a new low altitude record for this latitude. It states that "Albert Marshal, a Three Rivers artist, has returned from examining a small glacier on the side of Mt. Stewart in the Sequoia National Park, at an altitude much lower than glaciers normally are found.

Two years ago Marshal sighted crevasses of the glacier when looking with powerful binoculars from the top of Alta Peak. Last year he climbed Mt. Silliman, thinking to get a better view of the north side, but heavy snows of the previous winter still filled the crevasses.

Tamarack Lake Camp

This month Marshal and H. K. Armstrong, a geologist, left Giant Forest on foot. They followed the High Sierra Trail part way and made camp below Tamarack Lake. Because of a leg injury, Armstrong did not accompany Marshal on the rugged climb up Mt. Stewart.

After covering much rough country, crossing a snow pack and climbing over the terminal moraine, Marshal came upon the exposed ice of the glacier. He found it to be about a quarter of a mile long and several hundred feet wide. The Bergschrund, or crack between the glacier and the mountain, which Armstrong had told him to look for, was there; also the crevasses.

Ice Sound Effects

Coming from the foot of the glacier was water charged with silt, and there was a pool of water thick with silt. Marshal could hear the ice crack, snap and groan.

According to the Sierra Club's glacier-study committee, there are no glaciers below 13,000 feet. This glacier is at an elevation of about 11,700. Mt. Stewart is at the headwaters of the Kaweah River.

LIZARDS

(Continued from Page 16)

which startled and created quite a stir among world scientists a short time ago.

"With these skulls and specimens we already have at the museum," Dr. Hall said, "we will be able to tell definitely, after study, whether this is the grand-daddy of all reptiles. This may be the oldest of the fossils found, and might well prove to be the 'missing links' between the reptiles and the amphibious some 230 to 250 million years ago."

The prize fossils uncovered northwest of Garnett are found in a shale. When members of the excavation party remove a rare piece they wrap it in soft toilet tissue—since the pieces are delicate and easily broken. Later the pieces of fossil are treated with a transparent plastic dissolved with alcohol, and sent to the museum at the university.

(Continued on Page 30)

(Continued from Page 29)

The excavation area is about 20 feet square and work is slow and tedious. The scientists pick at the shale with small claws and then pry up the layers with knives. Small brushes are used to whisk dust and dirt from the pieces of shale holding the specimen.

Altogether this is a delicate operation, requiring skill, patience and an enthusiasm for one's work, far beyond that of mere curiosity, such as is engendered solely by the true scientific spirit and possessed only by the real scientist himself.

BAUXITE

(Continued from Page 6)

some eighteen miles southwest of Little Rock, is the center of these tremendous bauxite reserves. Relying upon this source, seven aluminum plants have been built and now are operating in the state of Arkansas with a total investment of nearly one-fifth of a billion dollars, employing more than four thousand workers, drawing approximately 20 million dollars in pay rolls in 1953.

Thus a new industrial empire is rising in which was once one of the poorest states in the union, producing more than 100 chemical products consisting of everything from toothpaste to a cleansing ingredient, and from a chemical for treating ulcers to aluminum transmission housing for army tanks, from this fine white powdery substance, alumina, obtained from the mineral bauxite.

Of the millions of dollars spent here, the most of it has gone into some enormous plants whose principal business is to turn out "pig" aluminum used in the metal trades. Many of these plants will produce several million pounds of pure aluminum daily and in this way they give new vitality to all Arkansas.

CLAYS

(Continued from Page 12)

a high temperature. Most persons are surprised when they observe the changes which take place in the firing operation.

Clays can be as interesting and attractive as collectors would have them be, and anyone who displays such specimens need hide them from no one.

Prejudices vanish as men become acquainted with the subject—a statement just as true in clay mineralogy as in human relations. The writer is sure that everyone who seeks knowledge of the clays through collection and study will find much of interest in this otherwise prosaic substance.

Edmond Preston Hyatt
Brigham Young University
Provo, Utah

ANSWERS: Test your knowledge. (Check the ones you have correct.)

a.—(1) Aragonite. A mineral with the formula of calcite ($Ca\,CO_3$), but differing in crystal form, —being orthorhombic.
b.—(1) Amethyst. A purple or bluish-violet form of quartz ($So\,O_2$), used as a semi-precious gem-stone.
c.—(1) Barite-rose. A form of barium sulphate having a peculiar rose-like crystal habit.
d.—(1) Meteorite. Any stone or irony substance falling to earth from the sky, being of extra terrestrial origin.
e.—(1) Gusher. Petroleum pouring from an oil well under a considerable head of pressure.
f.—(1) Cat's-eye. A greenish, chatoyant, variety of chrysoberyl. (Dana)
g.—(2) Cairngorm. A variety of smoky quartz, commonly found in the Cairngorm district of Scotland.
h.—(2) Amalgam. An alloy or union of mercury with another metal as employed in the process of recovering gold.
i.—(2) Scoria. Rough, clinkerlike, more or less vesicular eruptive lava.
j.—(3) Carbuncle. A gem of a deep-red color, usually a variety of garnet, though the name also includes the ruby and the spinel.
k.—(3) Boose. Gangue rock mixed with ore. Tailings. Also spelled bouse.
l.—(3) Kidney-ore. A variety of hematite, occurring in compact kidney-shaped masses.
Total—Score 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect.

GET A HOBBY!

If the politicians irk you
And you'd rather be in "Turku,"
Don't give doctors all your money
Seeking disposition sunny.
Get a hobby!

When your work becomes a drudge,
And you feel like so much sludge,
Don't go jumping on the boss
'Cause he says your output's dross.
Get a hobby!

Do you wonder why the spouse
Says of late, "You are a louse!"
And the kids all run and scoot
Like the cat, that gets the boot.
Get a hobby!

Are your problems all too weighty?
Do you hit the curves at eighty?
If the road seems full of hogs,
And the world gone to the dogs—
Get a hobby!

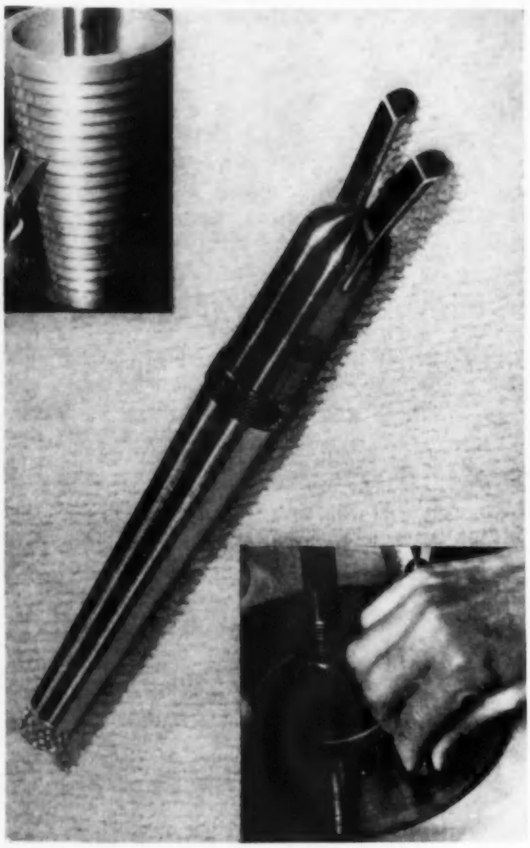
George R. Wells

HOBBIES ARE FINE!

Why not get a hobby? Doctors and psychiatrists constantly tell us that many business and professional men in this modern age are living dangerously near the limit of both their physical and nervous endurance. The pace is fast and the tension terrific as is evidenced by the sudden passing of so many prominent persons in the very prime of life.

Moral—get a hobby! What is needed most is something that will give complete mental relaxation and diversion, yet at the same time prove interesting, educationally profitable and a challenge to the imagination and intellect of its devotees. In this respect, there are few hobbies which fill the bill like some one or combination of the earth sciences: mineralogy, geology, paleontology, lapidary work, collecting and all the rest.

Get an earth science hobby and you may live longer, and certainly much happier.



PRIZE QUESTION

(Continued from Page 18)

was no shovelful of sand that did not show color. In one place he was delighted to secure as much as a spoonful of gold and black sand for every pan washed out. He soon forgot everything else, giving himself up entirely from "daylight 'til dark" to his labors, and the fascinating task of seeing how much gold and black sand he could secure and put in the black-iron kettle he had brought out to the spot for that purpose.

When John returned, he was somewhat amazed to see Hank running up from the river with their kettle in his hand. Explanations quickly followed, and John immediately made an inspection of the mine. He at once concluded that panning was not the best way to obtain the gold. At his suggestion a dam of stones, brush and earth was built to raise the water in the slack water area so that a sluice-way could be installed to hasten the washing process. No lumber being available, incredible as it may seem, the sluice was constructed of sections of bark from elm trees, into which baffles were fitted at proper intervals. The area where Hank had found the concentration much higher than elsewhere proved to be caused by a large crack in the bed-rock that had crossed the river on a diagonal. This was by far the richest part of the mine and to be sure it was mined out with the greatest of care. To do so the river was diverted and some blasting was resorted to, to break down the sides of the crevice.

Both men worked hard at their mining, to the subordination of everything else that could be put aside, continuing their operations until cold weather put an end to the sluicing. The wagon and oxen were sold, their tools cached, and the gold and black sand was conveniently put up in buckskin bags and loaded on the back of the riding horse along with some duffel. Thus equipped, the brothers disappeared in the general direction of Winona. How-

(Continued on Page 37)

PHOTO CONTEST OF INTEREST TO ROCKHOUNDS

Pictures from your rock hunting expeditions, and any nature subjects, are worthwhile entries for the 9th Chicago International Nature Photography Exhibition, at the Chicago Natural History Museum during February 1954. Geological subjects are especially welcome, but there are also classes for plants and animals. There are two divisions, one for prints and one for color slides. Silver medals and ribbons are awards in each classification.

If you have never had an opportunity to obtain a highly qualified opinion of your pictures, this is it, in the foremost exhibition of the type in the world. Deadline is Jan. 16, 1954. Write to Eugene Stitz, 4754 N. Karlov, Chicago 30, Ill., for entry form.

MORE ON SPECIFIC GRAVITY

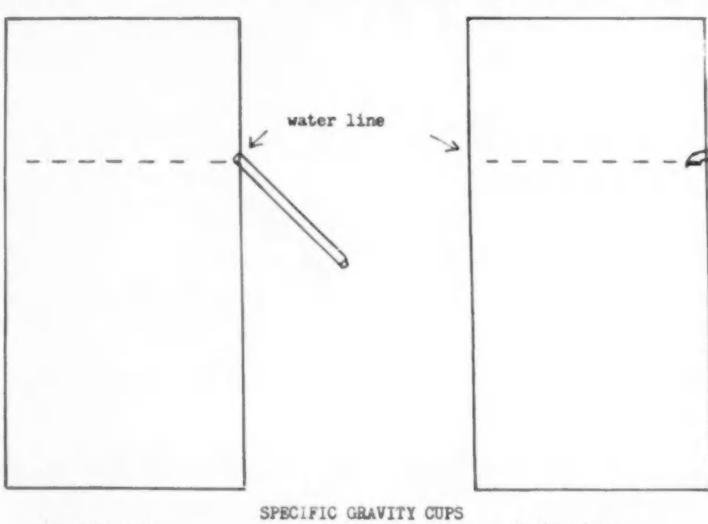
A Letter to the Editor of Interest to Our Readers

Dear Editor:

Perhaps your readers will be interested in a method of determining specific gravity which is different from the one described by Mr. Pugh in the September issue of Earth Science Digest.

Since the specific gravity is the ratio of the weight of a specimen to the weight of an equal volume of water, it may be obtained by actually weighing the water displaced by the sample. This can be done by placing the sample in a cup full of water and catching the water which overflows. In order to simplify the catching of the water it is best to use a cup or can with a spout. This may be made from any tin can, or cup, by soldering to it a piece of tubing for a spout. Copper tubing, such as is used for the gasoline line of a car is easy to obtain, easy to solder, and easy to bend to the desired shape. This should be soldered in the side of the can about one-third of the way down from the top. It should slope down at a slight angle, or better still, be bent to form a syphon.

The process of determining the specific gravity is to fill the can with water until it flows out of the spout. After the water has stopped dripping from the spout, place under it a previously weighed pan or smaller can. Weigh the specimen and place it in the can of water, being careful not to splash water out over the top (the reason for placing the spout one-third of the way down is to lessen the danger of splashing water over the top). When the water stops dripping



SPECIFIC GRAVITY CUPS

Straight tube — Syphon type

from the spout again, the water in the smaller can will be that which was displaced by the specimen. This water is then weighed (the weight of the small can subtracted), and the weight of the specimen divided by the weight of the water. The result is the specific gravity.

If the specimen is weighed in grams and the overflow water caught in a "graduated cylinder" the volume of water in cubic centimeters may be used as the weight of the water in grams. (A gram is defined as the weight of one cubic centimeter of water.)

In determining the specific gravity of a specimen which absorbs water, the specimen should be soaked in water for 24 hours, and then air-dried before starting the test.

The syphon shaped spout has certain advantages, and disadvantages. Dripping from a syphon stops much quicker than from a straight tube. However, it takes a larger specimen to start the flow in a syphon, than from a straight tube. If it is desired to use a syphon specific gravity cup for a specimen which is too small to start the flow of water, the flow may be started by placing in the cup of water (after the specimen has been put in), a large marble, or other nonabsorptive object whose volume has previously been determined. This volume is then subtracted from the volume of water collected in the small can.

I am a Division Geologist with the Missouri State Highway Department, and this is the method we use in determining the specific gravity of gravel, limestone, concrete aggregate, et cetera.

Very truly yours,
C. Helmer Turner, P.E.
Division Geologist

* * *

Capitol Reef National Monument, in Utah, is a wild, partly unexplored area of intricately eroded, brightly colored, and tilted rocks, awesome cliffs and canyons, and rock masses carved by wind and rain into weird and fanciful figures.

ISLE ROYALE GREENSTONE

(Chlorastrolite)

Sometimes called turtle backs because of its crystal structure and unique markings. It is an igneous material and the pattern of the mineral is supposedly caused by the rate of cooling at the time it is formed, the color is mostly of iron origin, the copper present is in a free metallic state and as far as can be determined has no bearing on color. It is a greenish fibrous material occurring in small spherical aggregates as a secondary material in the small gas pockets in the igneous rock, it is a variable mixture of several minerals, especially prenite and thompsonite, uniquely marked in colors ranging from white to dark greens. It is also chatoyant, that is, shows a changeable silky, wavy sheen caused by its fibrous structure (hardness—4 to 6).

The only place this material is found in gem quality is in Isle Royale National Park, Michigan. The rules of the Park, however, prohibit any chipping or disturbing of the natural terrain.

JOAN MARKHAM,
Houghton, Mich.

OPTICAL QUALITIES RIVAL DIAMONDS

From New York comes the announcement that a new synthetic gem-stone has been created in the laboratories of the National Lead company. They have developed a process for making strontium titanate, a compound which has never been found in nature, that is claimed to rival the diamond in brilliance and clearness.

The company states that it is the first crystal material ever produced in the laboratory which has the optical properties of the diamond. It is made of titanium, strontium and oxygen by a flame-fusion process.

It is thought that, when developed on a commercial scale, the crystal may be expected to find wide use in the manufacture of lenses, and other optical equipment, as well as for jewelry, where it should become quite popular.

HOW TO CUT THOMSONITE

Origin and Nature of Thomsonite. This beautiful, porcelain-like gem material is found imbedded in basic igneous rock on the north shore of Lake Superior. It can be recovered from the rock as spherical pebbles, from the size of a large cherry down to the size of a cherry pit, and smaller; or, as irregular masses, some of which are larger. The material is brittle and fragile, and consequently difficult to shape, cut and polish without damaging, chipping or completely shattering the stone. Careful and proper cutting and polishing will develop it into a beautiful and unusual cabochon with characteristic features and markings not found in any other type of gem stone.

There should be a few thomsonites in every cabochon collector's display cases.

Cutting. A thomsonite is not really cut, it is sanded into shape. Use a carborundum cloth, 220 grit, dry, on the usual 3-inch sanding wheel. Hold the stone with the fingers, touching it gently to the dry cloth, just for a moment, and rolling and rotating it so that the part of the stone which is in contact with the wheel is constantly changed by these motions. Use no pressure. Be extremely careful not to overheat the stone. The surface layer will easily cut away, revealing the pattern beneath. Remove just enough of the entire surface to show the character of the design beneath, without any regard to the shape or curvatures which result from this operation.

Dopping. Now examine the stone to find its most desirable surface, and dop the stone so that this pattern will appear as the top of the finished cabochon.

Finish Grinding. With the same sanding wheel, dry, the stone is then shaped to give it the proper curvatures around the girdle and over the top. By dopping the stone can be much more easily and gently handled, and securely held. This operation is the most important one, as it is easy to damage the stone unless great care and patience are applied.

Be sure to outline the girdle just as you want it to appear in the finished gem, but disregard completely the part below the girdle, which is held in the cement on the dop. Smooth away patiently and slowly all depressions, irregularities, and flats. Give the stone its desired shape.

Polishing. You can now polish the stone in the usual way on a hard felt wheel using your favorite polishing powder. A leather wheel may be your preference. Work slowly, wet, until you have a mirror-bright polish, and do not be satisfied with anything less.

Undopping. This is done with as little heat as possible, peeling away the softened cement from the stone gradually.

Lapping the Base. The lower half of the gem is now cut away on a diamond lap of 300 grit by simply holding the stone by hand to the wheel. Use plenty of water for this operation. Use only gentle pressure. Watch for "pull" of the lap on the stone and keep rotating it constantly. When the excess lower portion is completely lapped away to the girdle line the stone is finished.

J. Daniel Willems

PIONEER GOLD MINE PRIZE QUESTION

(Continued from Page 33)

ever, they appeared on the scene the following spring, this time with their families and some better facilities for mining the gold from their claims. No one knows how much gold the two brothers recovered from their mine, but judging from the size and number of sacks that they took away with them, the amount must have been considerable, being once reputed to have been between $25,000 and $30,000. This old midwest mine in a region where gold is seldom expected to be found, has been operated at various times ever since, always, as in depression years, paying off in day's wages, but no bonanza.

by Frank L. Fleener

Alert: One annual subscription to E.S.D. will be given the first person (earliest post mark) reading this story, who writes us such details concerning the feature, as the exact location of these "gold sand" deposits, and the time and circumstance concerning the mining operations herein described. This information will be published and the subscription credited to advance, or, to any other person designated by the winner.

Mail to the Editor

(Answer: Prize Question for Sept.)

Congratulations and one year's advance subscription to Earth Science Digest go to our friend Merton J. Van Antwerp now of Wisconsin Dells, for being first to answer our September prize question, "Where Did the Sands Run Out?"

Merton, who is a charter member of the Mineralorist Society of Joliet writes, "Edison found the 'black sand' along the coast in Sussex County, New Jersey while he was out walking along by the seashore. He filled his pockets with it because he was curious and took it to his laboratory. A workman with a magnet stumbled against the table where the sand lay and the magnet picked it up. This gave Edison an idea, and for a number of years he worked on a plan for separating metal from low-grade ores by magnetism.

"He discovered the sand about 1887, but it was some years later that his invention was perfected. Then he bought a large tract of land in Sussex County and put his plan into execution. The town of Edison grew up and the quarrying and crushing of rock went on for several years, until the latter part of the Nineteenth Century, but the project was not a success, and by 1898 the little town of Edison was a deserted village. It was at one time the most up-to-date mining town in America."

Merton J. VanAntwerp
October 9, 1953

Art was born when man first recognized color. I like to believe that it was the color of a beautiful rock.—W

HOW TO SET GEMS WITHOUT SOLDERING

Lecture prepared by Michael Endres, and delivered at the April 3, 1952, meeting of the Chicago Lapidary Club as part of a lapidary instruction course.

Most good lapidists come to a stage where they have an excess of cut and polished stones and nothing more to do than display them occasionally as "bragging pieces."

The more hardy souls finally set forth and purchase a saw, files, silver, solder and a torch. They will make jewelry, and now they have acquired the tools—which is always the easy part. But when it comes right down to soldering, their intentions—and egos—melt away with their silver. They just can't solder! To help those lost souls, the following examples of non-soldered jewelry, are set forth:

I. PENDANT

Fig. 1

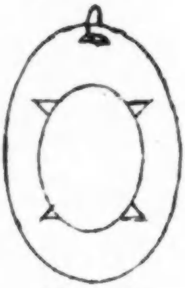


Fig. 2

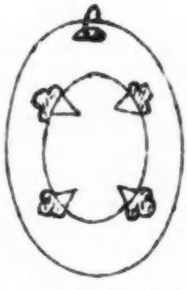


Fig. 3

Fig. 1—Lay out the shape of the gem on silver. Then pierce four holes (A) with a drill, each about ⅛" to 1/16" away from the gem pattern, and another (B) near the top of the pendant.

Fig. 2—Saw out B to form hole for link to chain. Saw other holes to form triangular prongs.

Fig. 3—File edges of cut-out portions into floral or leaf designs. Smooth prongs and fold over stone.

II. BROOCH

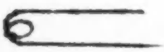


Fig. 5

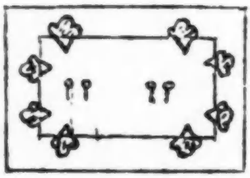


Fig. 4

Fig. 6

Follow directions for making pendant with the exception of a hole for link to chain.

Fig. 4—Drill four additional holes at each end of the brooch (but within the boundaries of the gem outline) and saw to form slits.

Fig. 5—Make a twist of wire. With a hammer flatten out the center portion of either straight section.

Fig. 6—Pass the wire thru the slits so that the flattened portion "locks" with them. Form a hook in the end that extends thru and file a point on the other end of the wire. Illustrated is a side view of the finished piece.

—See Next Page—

HOW TO SET GEMS—Cont.

III. BRACELET

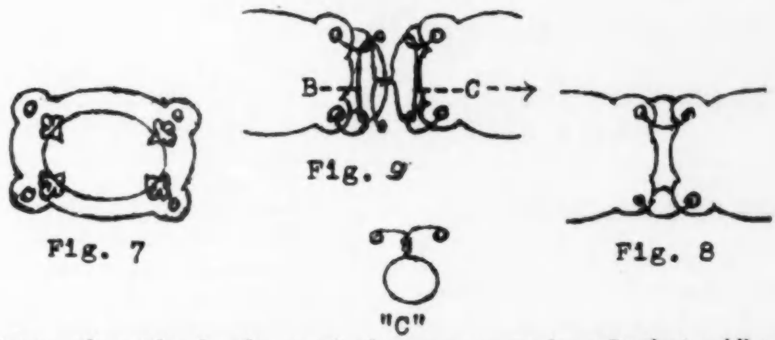


Fig. 7—Prepare the setting for the gem in the same way as for a Pendant, adding holes at the four corners of each bracelet link.

Fig. 8—Make small wire circles to connect the links.

Fig. 9—To form bracelet catch—make a large wire circle (B) to attach to small circles on one end link, another wire circle with twisted ends (C) to attach to small circles of other end link. Fasten catch by passing C thru B.

SILVERSMITHS GET NEW IDEAS FROM ANCIENT CRAFTSMEN

THE NAVAJO AND PUEBLO SILVERSMITHS, by John Adair. University of Oklahoma press, 220 pp.

This is not a new book, as it was published in 1946, but it is of continued current interest for anyone who makes or collects silver jewelry. The Navajos first learned to work silver about a century ago and from them the Zuni, Hopi and other pueblo dwellers learned the art.

Thus it is possible to trace the history of the craft back to its first practitioners, and to study the evolution of design, the place that silver and later turquoise jewelry has played in the social, economic and ceremonial life of the southwestern Indians. The author has had unexcelled opportunity to watch the craftsmen at work, to study their methods, their philosophy of design, and to know the men now at work in this field. Free use of illustrations, especially of the old pieces made before the flood of tourist material came on the market, and of the Indians at work, are of as great value to the white collector and craftsmen as the text itself.

MUSEUM AND COLLECTOR

(Continued from Page 5)

finest mineral specimens in the world is so dirty and disorganized and neglected that it is not a pleasure to see them any more.

In many respects the mineral clubs, with their conventions and open meetings where minerals and gems are shown to the public, are taking over much of the functions of the museums in this respect, and could well be held to be a proper recipient of the bounty of surplus specimens from the museums and public collections of this country. What do the museums think about this? What do the collectors think?

OFFICIAL ORGAN OF MIDWEST FEDERATION

MIDWEST CLUB NEWS*

Edited by
Bernice Wienrank, Club Editor

NEBRASKA MINERAL AND GEM CLUB'S members are donating polished cabochons for a permanent gem display at the University of Nebraska. It will be placed in the University's Morrill Hall.

CHICAGO ROCKS AND MINERALS SOCIETY on Sept. 12 heard Robert Fine of Arlington Heights, Illinois, discuss the history of jewelry casting. Mr. Fine later demonstrated the lost wax process of casting.

WISCONSIN GEOLOGICAL SOCIETY opened its first fall meeting with reports from its members on their summer field trips. Bragging rocks were exhibited.

The *Trilobite*, the organization's bulletin, devotes a special page to its junior members. This feature is unique among Midwest Federation Society bulletins.

MINNESOTA MINERAL CLUB was a recent guest of the Michigan Mineralogical Society during a six-day expedition to Michigan's upper peninsula. The groups studied the interesting geological features of the area and collected more than 40 different varieties of minerals. 84 persons registered for the trip.

EVANSVILLE LAPIDARY SOCIETY recently heard George Land, research director of the West Kentucky Coal Company, lecture on "Coal as a Mineral." Mr. Land spoke authoritatively on coal as a sedimentary rock, tracing its evolution and geologic progress from the original peat-bog formation through structural strata and hardening processes to its present status as our most valuable source of energy. This process consumed an estimated 200 million years! Mr. Land pointed out that coal can also be used as a gem material and displayed a lovely pair of highly polished anthracite earrings as proof.

CHICAGO LAPIDARY SOCIETY will hold its Jeweled Christmas Tree meeting on Dec. 3. Other societies are cordially invited to attend. Guest speaker for the evening will be Joseph Cagen of the Cagen Jewelry Co. Mr. Cagen, who has traveled widely in Africa, will show and comment on colored films of the African diamond mines.

CLC meets on the first Thursday of each month at the Hamilton Park field house, 72nd and Normal Ave., Chicago, Ill.

MICHIGAN MINERALOGICAL SOCIETY recently heard Wallace B. Wing, past president of the Lime Association, relate interesting facts about the "Utilization of Lime." He discussed in particular the action of lime in offsetting silica in iron and nonferrous metals.

ROCHESTER EARTH SCIENCE SOCIETY on Sept. 13 was host to the Minnesota Geological Society for a trip to a quarry east of Rochester to collect Ordovician fossils and for an inspection tour of the iron mines of Spring Valley, Minn. (For full details on these mines, see "Iron Ores of Southern Minnesota," by Dr. Thiel, September, 1953, issue of *The Earth Science Digest*.)

* * *

**Societies are urged to send reports of their activities to this department, c/o Bernice Wienrank, 4717 N. Winthrop Ave., Chicago, Illinois.*

RESS is planning an exhibit of rocks and minerals at the Rochester Public Library during book week, Nov. 15-21. The club maintains a permanent exhibit, emphasizing various phases of the earth sciences, at Rochester College. A new display is set up every three months. Recently it was changed from a lapidary exhibit to one of leaf fossils from the Mazon Creek Area of Illinois.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS on Oct. 9 held a successful auction of gems, minerals, fossils and Indian artifacts. Afterwards, cookies shaped like fern fossils, trilobites and arrow heads were served with coffee.

ESCONI meets on the 2nd Friday of each month at the Downers Grove High School. Additional information about the club and its activities may be obtained by writing Mr. W. D. Kelly, 4613 South Lawn Ave., Western Springs, Ill.

WINNEBAGO ROCKS AND MINERALS SOCIETY on Sept. 13 drove to Devils Lake, Wisconsin, to study the geologic features of the Baraboo Range. A glorious day was reported, perfect for observing the hard quartzitic bluffs.

RECOMMENDED READINGS FROM SOCIETY BULLETINS

"Minnesota Ocean Fossils," by Don Wallace, September issue of *Rock Rustlers News*. Includes instructions for preparing fossils for display.

"We Go Underground," by John Mihelcic, October and November issues of *The Conglomerate*. A vivid description of Michigan's underground copper mines.

"Sapphires," by Dr. G. Black, September issue of *The Evansville Newsletter*. The story of sapphires from ancient India to Linde A.

"Photographing Your Specimens," by Larry Brezan, September issue of *The Trilobite*. Contains many valuable tips on how to photograph fossil and mineral specimens.

ALBUQUERQUE ROCKHOUNDS has an excellent motto for all rockhounds: Seek to find; gather to understand; share to deserve.

BLUE MOUNTAIN GEM CLUB's members, at the Sept. meeting, reported on their summer prospecting experiences. Rarest find was made by Mr. and Mrs. Henner, who found among the four thousand pounds of red and black obsidian that they had gathered, a piece with Indian symbols carved upon its surface.

Refreshments served at the end of the evening bore such whimsical names as: banded agate (sandwiches), jade (pickles), petoskey stones (raisin cookies), calcium (cream), crystals (sugar) etc.

FALSE SYNTHETIC DIAMONDS

Numerous times in the past workers have attempted to manufacture diamonds synthetically. Their efforts have led many of them to claims which have not withstood the rigid tests of scientific methods.

The most recent case is that of Dr. Meincke, who has just been sentenced by a court in Bonn, Germany, to three years in prison. With him were sentenced also his wife, his son, and his niece. All were involved in a scheme by which they had obtained more than a half million Marks for their illegal false operations.

The BOOK SHELF

EARTH SCIENCE — THE WORLD WE LIVE IN

Namowitz and Stone, New York
D. VanNostrand Company, Inc.
1953, 438pp.

At last we have an Earth Science text which seems appropriate for nearly every occasion. Its title most adequately describes it. The range of its adaptability appears practically limitless. For the eager high school instructor looking for a text on the secondary level, its organization and materials, and the simplicity of its presentation are ideal, while at the same time those working on the college level may find much of value in it as a book of ready reference. And for the professional and amateur geologist alike, as well as for the rankest rockhound, there are to be found many hours of pleasant and informative reading between its covers.

Throughout the book, the authors have aimed to develop real understanding of the processes and concepts with which earth science deals. They have also sought to present basic ideas in sufficient detail to make them meaningful to high school students as well as the laymen. A dogmatic approach has carefully been avoided. There has been no compromise with completeness or adequacy in the treatment of topics, which recommend the book as being highly satisfactory.

The subject matter is presented in five major units of organization, with adaptability which will fit into most every teacher's needs. At the end of each chapter, there are topic questions, and each question consists of two or more parts. They have been prepared specifically to cover the principal ideas discussed in the text material, and add greatly to its value and interpretation.

No review of the book would be complete without mention of the many excellent illustrations employed liberally throughout the text. Both the pictures and the diagrams have been well selected, and without fear of contradiction one can say that the latter are without parallel in any similar production which we have ever seen. They are adequate and to the point in their arrangement, and are superbly drawn. Every reader of *Earth Science Digest* would do well to have a copy of this book in his library for ready reference. —B.H.W.

MAN AND HIS PHYSICAL UNIVERSE —Richard Wistar, New York, John Wiley & Sons, 1953, 488 pp., $4.75.

What's a pterodactyl? How does television work? How did Einstein prove his relativity theory? What is nuclear fission? How many times have you asked yourself these or dozens of similar questions but recoiled from the labor of finding the answer because of ignorance of what field of science would cover the subject and because of unfamiliarity with the technical vocabulary in which most explanations are presented.

Man and his Physical Universe is a text which has been written to answer such questions as these for the non professional scientist and the average man. Designed for use by students majoring in non-science courses, the text is not divided into isolated fields of science, but in treating any topic draws on any or all branches of physical science to present a simple explanation. The plan which is followed is to first present a natural phenomenon of common experience, and after discussing the methods employed by scientists in arriving at an explanation, to then show the general application of the laws which have been derived. By this method, the student is shown the procedure followed in a scientific inquiry, and is guided along logical lines in his own investigations of new problems which may confront him.

The text is admirably supplemented by a large number of well chosen illustrations, and each chapter contains a brief summary and problems for purposes of review.

LIFE OF THE PAST, by George Gaylord Simpson. Yale University press, 198 pp.

Paleontology is a hard word, and a hard subject, but Dr. Simpson, who is a Columbia university professor and a curator of the American Museum of Natural History, in this introduction to the science of fossils, makes a complicated subject as clear as possible and as interesting as it deserves to be.

He introduces the concepts and something of the methods of paleontology in his first chapter, which is a walk from Chaco canyon in New Mexico over an area where the story of 20 million years is told in the rocks. This leads him to chapters on the significance of fossils, of their order in the rocks, of restorations, of the modern idea of ancient communities and their environments, of evolutionary change through gradual differentiation in successive populations, and closes with an elaborate summary of the kingdoms, phyla and principal classes known among the fossils, with illustrations and modern examples. The sketches that illustrate the text are uncluttered and vigorously informative.

PHYSICAL GEMMOLOGY, by Sir James Walton. London: Pitman Publishing Corporation, 1952; 304 pp., $6.00.

Written for the serious student of gemmology, this book is replete with detailed discussions of the great mass of encyclopedic knowledge and the basic sciences on the subject. The eight chapter headings are: Atoms and molecules; Crystallography; Geology; Microscopic Characters of Minerals; Optical Characters of Minerals; Colour; General Physical Properties of Minerals and The Fashioning of Minerals for Gems. There are 400 illustrations which add enormously to the teaching value of the book. J.D.W.

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THE BONANZA TRAIL

by Muriel Sibell Wolle, Bloomington, Indiana. Indiana University Press, 510 pp. $8.50

The mountain states of the west are dotted with ghost towns — some living, more dead — that stand as monuments to the acquisitive fury and the ingenuity and labor of the miners who helped settle this vast country. From the rich veins of metal that they located on the rugged mountain sides and in the pathless deserts came billions of wealth that supplied the financial backing for the industrial growth of this nation in the latter part of the nineteenth century.

Mrs. Wolle, who is head of the department of fine arts at the University of Colorado, is one of the most industrious and able historians of western mining history. In the course of 20,000 miles of travel by car and on foot over roads of all descriptions, she has visited hundreds of mining towns in twelve western states, sketched their remaining buildings or ruins, talked to old time residents about the riproaring days when wealth came easy and went the same way, and has read deeply in the yellowing files of boom town newspapers such as Mark Twain once worked for.

"The Bonanza Trail" tells the story of some famous camps—Virginia City, Nev., Tonopah, Deadwood, Tombstone and Central City, among others, and some forgotten ones with fascinating names — Miner's Delight, Sailors' Diggings, Bullfrog and Southern Cross. Her accounts of visits to all these ghost towns, where mine dumps, twisted machinery and decaying buildings speak of the wealth of another day, are illustrated with more than 100 excellent drawings and twelve state maps. Mrs. Wolle is the author of a previous book, "Stampede to Timberline," which treats the ghost towns of Colorado fairly exhaustively.

—R. P. M.

Complete your files of the Earth Science Digest now. See Inside Back Cover

STRUCTURAL GEOLOGY, by E. Sherbon Hills, Ph.D. (London) D.Sc. (Melb.)

Do ripple marks or beach shells found in the layers of sedimentary rock high in the mountain areas puzzle you? Do tilted layers and all the peculiar formations cause you to wonder how it all happened?

These and many other equally interesting problems in structural geology are discussed in a compact little book written by Dr. E. Sherbon Hills, Professor of Geology and Mineralogy in the University of Melbourne, Australia.

This book, which is published by John Wiley & Sons, Inc. 440, 4th Ave., New York City, New York, is loaded with references to every conceivable authority on Structural Geology and related subjects and refers to many types of folds that occur in the earth's surface. If there is not space enough in this book to cover the subject in detail it certainly tells you who the authorities are on the subject of interest to you. One of the many interesting features about this book is the broad scope of examples of geological phenomena used throughout. Locations are selected all over the globe that best illustrate the structural formations the Author is describing. This indicates a very comprehensive knowledge of the basic structures that hold the continents together despite the continuous heavings of Old Mother Nature. W.H.A.

A HISTORY OF JEWELLERY, 1100-1870, by Joan Evans. New York: Pitman Publishing Corp. 240 pp.

This is one of the most sumptuous publications of its kind in recent years, with 10 color plates and 176 pages of illustrations of jewelry from the Middle ages until the last century. The author is a distinguished English woman scholar who has written a number of books on jewelry, medieval lapidary work and design, and on the life of the Middle ages.

Many of the hundred and more jewels she illustrates are royal pieces from museum or famed collections, a few are still in private hands where, as she says, they can come alive by being worn as they were intended. The rest she illustrates by portraits, drawings such as those in Books of Hours, and designs published by craftsmen.

Her task both in text and pictures has been to illustrate and explain the changing tastes, based on changes in dress, in sophistication, and in technique of the lapidary and jeweler, that she finds throughout the 800 years of her study. Many of the jewels will make a modern, used to the severe style of modern jewelry and the sparing use of handwork, gasp with astonishment at the magnificent craftsmanship that our ancestors enjoyed.

PETROGRAPHIE DES ROCHES SEDIMENTAIRES, by Albert Carozzi, Lausanne: F. Rouge & Cie S.A., Librairie de L'Universitie.

This is an elaborate essay in classification of the sedimentary rocks, written by a Swiss scholar. It is divided into two parts, of which the first classifies these rocks by their physical characteristics into conglomerates and breccias, sandstones, quartzites and tuffs and argillites. The second classifies them by their biochemical characteristics, such as the carbonates, the silicious rocks, the ferruginous rocks, the phosphates, the saline rocks, and the carbonaceous rocks such as coal. A preliminary classification discusses the minerals found in the sedimentary rocks, such as quartz, calcite and mica.

The excellence of the book, which is written in French that is not too difficult for the average reader who has some acquaintance with the language, lies in its thorough survey of recent literature in all the European languages, and in its emphasis on discoveries made with the microscope that have enabled more precise classification of rocks, especially those in which minute fossils occur. R.McF.

GIVE BOOKS FOR CHRISTMAS

INDEX TO ADVERTISERS

Adobe Crafters	31
Associated Miners	43
Bergling	35
Biebee	43
California House of Rocks	39
Classified Adv.	44
Coast Gems and Minerals	29
Diamond Saws	28
Earth Science Digest	Inside Back Cover
Ellison, Sally	43
Gem Cutter's Supply	35
Gems and Minerals	35
Grieger's	Inside Front Cover
Hurlbut, Irving	28
International Gem Corp	2
Lapidary Equipment Co.	45
Lapidary Industries	32
Minerals Unlimited	41
New England Diamond Corp.	47
Obers, John	43
Roberts, Tom Rock Shop	43
Rocks and Minerals	41
Shroder Instrument	28
Smith's Geode Industries	31 & 41
Stewart Art Craft	31
Technicraft	41
Ultra Violet Products	24 & 25
Van Nostrand, D. Co. Inc.	27
Ward's, Natural Science Est., Inc.	2
Waskey, Frank	33
Willems, J. Daniel	Back Cover
Yellowstone Agate	28

A NEW DAY FOR OLD MINES! . .
by Ray C. Frank Hocomo, Missouri

Scattered throughout Missouri, and many other states for that matter, are numerous "old mines," which have almost been forgotten. Many of these were abandoned in earlier days because of some accident, lack of capital or modern machinery, or perhaps on account of gross mismanagement they could not compete with other mines of richer ores or more competent and efficient supervision.

Many of these properties ceased to operate at a time when they were only well started, with an abundance of workable ore yet remaining. Typical of such mines is the old "Alice Mine" near Caulfield, Missouri which in fact was just a "digging" or big pit in the side of a hill. This particular mine was worked by the pick and shovel method for nearly 50 years for smithsonite, the carbonate form of zinc ore. Below this lay a body of zinc sulphide ore (sphalerite) which was only worked for one summer. Repeated drillings have since revealed this ore body to exist for a depth of 700 feet, enough to warrant refinancing and reopening the mine with a modern concentration plant, for preparing the ore for the market.

In the miners' parlance, this ore is known as "steel jack," on account of its association with iron (pyrite). It is also known as "rosin jack" or "ruby jack," according to its appearance. The latter frequently occurs in nice crystal forms.

In preparing the ore for the market it is first run through four crushers, the last two being ball mills which pulverize the ore to a flour. The flotation process is utilized to remove the ore from the gangue, which requires two operations due to the presence of the much heavier iron pyrite. In the first flotation process, the "rock" is floated off, while the zinc and iron settle to the bottom. This residue is next treated in the second process and the zinc is floated off and the iron remains on the bottom.

The zinc concentrate is now ready to be shipped to the smelters, and the iron pyrite may be utilized for making sulphuric acid, but not as an ore for iron, without special treatment which would not be economical at present, as the sulphur would be considered as detrimental to the steel produced.

I am writing this to call the attention of rock-hounds who may be located all over the country that there might be many opportunities near about them to re-open and re-work old properties which were long ago given up, and the location of many of which may be only known to a few of the "old timers" who are living in country roundabout.

Since 1949 the Bureau of Mines, Department of the Interior, has saved more than 120,000,000 tons of coal in beds not now being mined from destruction by outcrop fires, at a cost to the Government of less than a cent a ton.
